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Nutrition, Appetite and Weight Loss in Elders Living in Long-Term Care Facilities

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Abstract

Elders living in long-term care facilities often experience weight loss. Weight loss in elders has been shown to increase their risk of death. Existing research has identified numerous factors associated with appetite and weight loss in elders. Dementia, depression, acute and chronic illness, and medications have all been identified as potential causes of decreased appetite and weight loss in elders. Only a few nutritional and appetite assessment tools exist, and these tools are not widely used in long-term care facilities. The purpose of this descriptive study was to validate the Simplified Nutritional Appetite Questionnaire (SNAQ), an appetite assessment tool in long-term care facilities. In addition, the study was designed to explore other potential contributors to poor appetite and weight loss in elders. Included in the study were 92 elders living in four Midwestern long-term care facilities. Participants were weighed and appetite was assessed using the SNAQ monthly. More than 50% of participants scored ≤ 14 on the SNAQ each month, suggesting poor appetite in this population. Most elders who lost $\geq 5\%$ of their body weight each month scored ≤ 14 on the SNAQ. The SNAQ showed poor sensitivity for weight loss $\geq 5\%$ each month and over 6 months, but high specificity in this population. Initial and sixth month data indicated that Cronbach's alpha coefficients for the SNAQ would improve from 0.51 to 0.57 and 0.56 to 0.78, respectively, when question 4 was removed. Construct validity was supported by significant correlations with number of diagnoses ($r = -.343$, $p = .001$) and dementia ($r = .313$, $p = .01$).

The present study suggests that illness and medications are important factors in appetite and weight loss in elders living in long-term care facilities. This study supports

the SNAQ as a useful tool, but additional studies are needed to further explore the low sensitivity of the SNAQ in this population.

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CHAPTER I

Introduction

In this chapter the background, problem, and purpose of this study regarding nutrition, appetite, and weight loss in elders living in long-term care facilities are discussed. The research questions and significance of the problem are presented.

Background

According to the 2010 United States Census Bureau Report, the population of persons aged 65 years and older is steadily increasing. Aging increases an elder's risk of living in a long-term care facility. Hertzell and Smith (2001) reported that approximately 18% of persons 85 years and older live in long-term care facilities, compared with less than 5% of those 65 to 84 years of age. Aging increases an elder's risk of developing dementia (Yip, Brayne, & Matthews, 2006). Dementia is the most important predictor of an elder's placement in a long-term care facility; however, other factors such as chronic illness, functional decline, weight loss, and lack of social support also increase the risk of admission to a long-term care facility (Bharucha, Pandav, Shen, Dodge, & Ganguli, 2004; Payette, Coulombe, Boutier, & Gray-Donald, 2000). Elders who live in long-term care facilities have an increased risk of nutritional deficiencies (Suominen et al., 2005). These deficiencies can lead to weight loss, which increases an elder's risk of death (Sullivan et al., 2002). Changes in appetite may precede weight loss in elders living in long-term care facilities (Wilson et al., 2005). Therefore, proper assessment of nutrition, appetite, and weight loss is imperative in order to prevent weight loss and poor clinical outcomes.

Weight Loss in Elders

Weight loss and nutritional deficiencies are common for elders living in long-term care facilities; however, few studies have reported the prevalence of these conditions. Beck and Ovesen (2002) reported that 38% of long-term care residents had greater than 5% weight loss during a 1-year observation period. In a recent study of long-term care residents, nutritional deficiencies were reported in 24% of participants who ate orally according to the Mini Nutritional Assessment (MNA) (Volkert, Pauly, Stehle, & Sieber, 2011).

Elders with significant weight loss have an increased risk of pressure ulcers, hip fracture, decreased functional ability, decreased quality of life, and increased risk of death (Dey, Rothenberg, Sundh, Bosaeus, & Steen, 2001; Ensrud et al., 2003; Horn et al., 2004; Newman et al., 2001; Olin, Koochek, Ljungqvist, & Cederholm, 2005; Richardson, Bedard, & Weaver, 2001). Although weight loss continues to be a significant problem in long-term care facilities, the literature suggests no comprehensive strategy to address the problem (Donini, Savina, Rosano, & Cannella, 2007).

Nutrition and Appetite

Nutrition and appetite are recognized as important factors in weight maintenance in elders. Decreased appetite is associated with weight loss in elderly persons (Wilson et al., 2005), and appetite has been shown in studies to decline with aging (Knoops et al., 2005; Sullivan et al., 2002). Although nutrition and appetite are recognized as important health issues for elders, few tools exist to assess nutrition and/or appetite. The tools that are available are not widely used, and most lack adequate validation (Donini et al., 2007; Jones, 2002).

Assessment of nutrition and appetite. Most long-term care facilities rely on documentation of meal intakes and measurements of residents' weights to identify elders who are at risk for weight loss and nutritional deficiencies (Kayser-Jones, Schell, Porter, & Paul, 1997). This approach is problematic since documentation of meal intakes has been shown to be unreliable, and weight measurements are often incorrect (Pokrywka et al., 1997; Simmons & Reuben, 2000). The Mini Nutritional Assessment (MNA) has been validated as a useful tool for assessing nutritional risk in elders (Guigoz, 2006; Guigoz, Lauque, & Vellas, 2002), and the Appetite, Hunger, and Sensory Perception Questionnaire (AHSP) as an effective tool for assessing appetite (Mathey, de Jong, de Groot, de Graaf, & van Staveren, 2001). However, the MNA and the AHSP are not widely used in long-term care facilities, which may be partially explained by the time and effort required to complete these assessment tools. Simple, quick, and easy-to-use tools to assess nutritional and appetite risk are needed so that proactive interventions can be initiated before weight loss and poor clinical outcomes occur.

The Simplified Nutritional Appetite Questionnaire (SNAQ) is a promising instrument developed by a team of geriatric experts comprising physicians, nurse practitioners, dietitians, and pharmacists (Wilson et al., 2005). The SNAQ is a quick, simple, and easy-to-use tool designed to measure appetite in elderly persons. Original testing using the SNAQ was performed between April 2002 and December 2003 in a major metropolitan area (Wilson et al., 2005). Additional studies have reported the SNAQ to be a useful tool for assessing appetite in older persons (Engel et al., 2011; Kaur, Miller, Halbert, Giles, & Crotty, 2008).

Multidisciplinary Team and Nutritional Care of Elders in Long-Term Care

Caregivers in long-term care facilities play an important role in assessing the health and well-being of elders. A multidisciplinary team approach is an essential component of nutritional care of elders. The multidisciplinary team consists of physicians, nurses, dietitians, dietary personnel, speech therapist, physical therapist, pharmacist, nurse's assistants, and more recently, advanced practice nurses.

Physicians and nurse practitioners who provide primary care to residents in long-term care facilities play an important role in identifying and intervening for residents with nutritional deficiencies, decreased appetite, and/or weight loss. The primary care physician is responsible for overseeing a resident's care plan and directing the multidisciplinary team. Therefore, it is imperative that physicians be informed concerning residents who have increased nutritional risk, poor appetite, and/or weight loss.

Although dietitians are responsible for overseeing nutritional care plans of residents who live in long-term care facilities, they often spend a limited amount of time in the facilities they serve. State and federal regulations that address dietitian services in long-term care facilities are vague and allow facilities to employ part-time dietitians and use consultant dietitian services. Additionally, long-term care facilities are not required to employ a registered dietitian (Center for Medicare and Medicaid Services Manual, 2011).

When a dietitian is not available to assess residents' nutritional needs, other health care staff such as nurses, certified nurse's assistants, or dietary personnel often assume this responsibility. These staff members may have limited knowledge and lack the assessment skills required to implement an effective nutritional plan of care (Crogan & Schultz, 2000b). Low staffing levels are linked to poor quality of care for residents, and

staff shortages in long-term care facilities are common (Harrington, 2001; Kayser-Jones & Schell, 1997; Woo, Chi, Hui, Chan, & Sham, 2005). In contrast, reductions in weight loss in residents living in long-term care facilities have been reported in those facilities that provide at least 3 hours of nursing care per resident per day (Dyck, 2007).

Nurse's assistants are often responsible for carrying out nutritional interventions. These interventions include positioning residents for meals, assisting residents with food and fluid intake, and administering nutritional supplements. Elders who are unable to feed themselves are at higher risk for weight loss and nutritional deficiencies (Berkhout, Cools, & Houwelingen, 1998; Schmid & Heseker, 2003; Sullivan et al., 2002); therefore, it is essential to have knowledgeable, well-trained staff to assist residents with meals. Nurse's assistants may be expected to assist several residents with meals at the same time. This can be problematic for residents who require an extended period of time to eat. Nurse's assistants have limited education and may not be familiar with specialized feeding techniques required for elders, which are especially important for frail elders with multiple medical diagnoses (Evans & Crogan, 2001). Long-term care residents require, on average, 35 to 40 minutes of staff time at each meal (Simmons & Schnelle, 2006). However, Crogan and Shultz (2000a) found that 81% of nursing assistants in a long-term care facility reported that they did not have enough time to provide quality care to residents.

Many factors contribute to nutritional deficiencies in elders, and successful interventions require cooperation of the entire health care team (Thomas, Ashmen, Morley, & Evans, 2000). Obtaining this cooperation may be difficult given that some

team members may feel that nutritional issues are not important or are not part of their jobs (Bachrach-Lindstrom, Jensen, Lundin, & Christensson, 2007).

Providing superior nutritional programs for residents living in long-term care facilities is expensive. Nutritional programs that add expense to the dietary budget may be met with opposition by long-term care facility administrators. Most long-term care facilities are at least partially government funded, and the direct cost of nutritional programs cannot be passed on to residents. Interventions for weight loss such as nutritional supplements are costly, and often supplements are wasted because residents do not consume them (Gosney, 2003). Research suggests a lack of staff education relating to nutrition and appetite in long-term care facilities (Crogan, Shultz, & Massey, 2001). Therefore, education programs aimed at teaching health care staff the importance of proper interventions for addressing elders' nutritional needs should be explored.

In recent years, advanced practice nurses have joined the multidisciplinary team of providers in long-term care facilities. Advanced practice nurses provide primary care to long-term care residents and serve as an educational resource to staff members (Bakerjian, 2008; McAiney et al., 2008). Improved quality of care has been reported in long-term care facilities that utilize the services of advanced practice nurses (McAiney et al., 2008). In a review of the literature, Bakerjian (2008) reported improved resident outcomes; better management of chronic diagnoses; and increased satisfaction of residents, families, and other health care staff members in long-term care facilities that utilized advanced practice nurses as primary care providers. Advanced practice nurses who work in long-term care facilities have the ability to assess, develop, and implement interventions for residents with nutritional deficiencies, appetite loss, and weight loss.

Additional research is needed to further explore, define, and confirm the roles of advanced practice nurses in long-term care facilities (Bourbonniere et al., 2009; Philpot, Tolson, & Morley, 2011).

Significance

The percentage of elderly persons continues to increase; therefore, it is anticipated that increased numbers of elders will be living in long-term care facilities (Hertzel & Smith, 2001). Nutritional deficiencies and appetite loss increase an elder's risk of developing poor clinical outcomes such as weight loss. Weight loss during a 6-month period has been shown to increase risk of death in elders living in long-term care facilities (Sullivan et al., 2002). Therefore, continuing research is needed to validate nutrition and appetite assessment tools that identify nutritional risk in elders living in long-term care facilities. This study will add new knowledge related to nutrition, appetite, and weight loss in elders living in long-term care facilities.

Purpose

The purpose of this study is to determine if the Simplified Nutritional Appetite Questionnaire (SNAQ), an appetite assessment tool, is a reliable, valid, sensitive, and specific self-report measure for assessing the risk for significant weight loss in residents living in long-term care facilities over a 6-month period. Cronbach's alpha coefficient will be used to estimate the internal consistency reliability of the SNAQ. Descriptive validity will be estimated by examining the relationships between SNAQ and weight loss. Sensitivity and specificity of the SNAQ will be calculated. Associations between the socio-demographic variables of age and gender and the health status characteristics of dementia, depression, acute illness, chronic illness, and medications and SNAQ score

will be examined. Hereafter the term *participants* will be used to refer to residents who live in long-term care facilities and agree to participate in this study.

Research Questions

This study is designed to answer the following research questions:

1. What is the internal consistency reliability of the SNAQ?
2. What is the sensitivity and specificity of the SNAQ in detecting significant weight loss of $\geq 5\%$ each month as well as over 6 months among participants?
3. Is there an association between poor appetite measured by the SNAQ and significant weight loss of $\geq 5\%$ each month as well as over 6 months among participants?
4. Are there significant correlations between poor appetite measured by the SNAQ and the variables socio-demographics (age and gender) and health status characteristics (dementia, depression, acute illness, chronic illness, and medications) and SNAQ scores among participants?
5. Are there significant correlations between significant weight loss and the variables socio-demographics (age and gender) and health status characteristics (dementia, depression, acute illness, chronic illness, and medications) among participants?

CHAPTER II

Review of the Literature

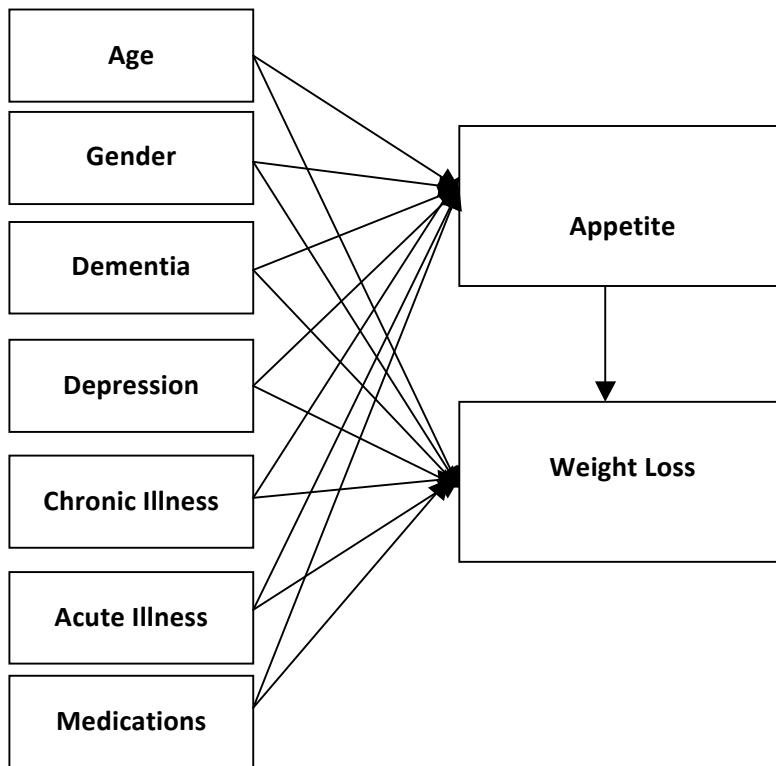
This chapter presents a review of the literature and the conceptual model. The review of the literature is discussed and summarized as it relates to nutrition and appetite, as well as weight loss in elders in long-term care facilities.

Conceptual Model

The conceptual model is derived from the review of the literature. This conceptual model is designed to assess the influence of socio-demographics and health status characteristics on appetite and weight loss and the descriptive association between appetite and weight loss among elders living in a long-term care facility (see Figure 1). The model is about the elder in long-term care and age, gender, dementia, depression, chronic illness, acute illness, medications, appetite, and weight loss. Nutrition is not a part of the conceptual model, but it is an unmeasured variable that mediates between appetite and weight. Therefore, the review of the literature focuses on nutrition as well as each of these major concepts.

Elders in Long-Term Care

Elders who are older or who have dementia, depression, incontinence, functional impairment, difficulty with activities of daily living, and decreased social support have an increased risk of institutionalization (Bharucha, 2004; Young, 2009). These factors should be considered when assessing elderly long-term care facility residents for potential nutritional deficits.

Figure 1. Assessment Conceptual Model as it Relates to Elders in Long-term Care

Elders who live in long-term care facilities have an increased incidence of nutritional deficiencies, loss of appetite, and weight loss (Abbasi & Rudman, 1994; Beck & Ovesen, 2002; Guigoz, 2006; Sloane, Ivey, Helton, Barrick, & Cerna, 2008; Suominen et al., 2005; Suominen, Sandelin, Soini, & Pitkala, 2009). Weight loss in elders is associated with poor clinical outcomes and an increased risk of death (Dey et al., 2001; Ensrud et al., 2003; Sullivan et al., 2002; Wedick, Barrett-Connor, Knoke, & Wingard, 2002). This review focuses on factors that contribute to nutritional deficiencies, loss of appetite, and weight loss for elders in long-term care facilities, to include: (a) the aging process (Alam, Larbi, Pawelec, & Paracha, 2011); (b) dementia (Navratilova, Jarkovsky, Ceskova, Leonard, & Sobotka, 2007); (c) depression (Simmons et al., 2008); (d) acute illness (Stratton, King, Stroud, Jackson, & Elia, 2006); (e) chronic illness (Wikby & Fägerskiöld, 2004); and (f) medications (Agostini, Han, & Tinetti, 2004). Nurses often

fail to recognize nutritional deficiencies in elders, and even when nutritional problems are identified, nurses may not provide appropriate interventions that address the cause of these nutritional deficiencies (Suominen et al., 2009). Social and environmental factors have an impact on appetite and nutrition for elders who live in long-term care facilities. These factors are important to address when assessing elders with nutritional deficiencies.

Nutritional Environment in Long-Term Care Facilities

The nutritional environment for elders who live in long-term care facilities typically includes restricted food choices. Meals are generally served on a schedule, and food may not be readily available between meals. Elders who depend on staff members to feed them may be forced to eat quickly (Kayser-Jones & Schell, 1997). Where residents eat their meals is important. Residents who eat meals in the facility dining room, rather than in their rooms, eat more and receive more assistance during mealtimes (Simmons, Babineau, Garcia, & Schnelle, 2002; Simmons & Levy-Storms, 2005).

Two major issues in long-term care facilities that contribute to lack of adequate feeding assistance for residents are lack of staffing and lack of education in proper feeding techniques for nursing staff (Simmons et al., 2008). Although long-term care facilities are required to meet state and federal guidelines for nursing staff-to-resident ratios, these ratios do not always coincide with the actual time required to care for residents in the facility. For example, Woo et al. (2005) reported that residents who live in long-term care facilities that have low staffing patterns are at higher risk of nutritional deficiencies. In most long-term care facilities, nurse's assistants have the primary responsibility of assisting residents during mealtimes, and this includes assisting residents with feeding difficulties. A resident who has difficulty with eating may need as much as

30 minutes to 1 hour of assistance during mealtimes, and this is usually not possible since staff members are expected to assist several residents during each meal (Kayser-Jones & Schell, 1997; Simmons & Schnelle, 2006). Long-term care facilities that provide 3 or more hours of nurse's assistant time per resident per day have a decreased incidence of resident weight loss when compared with facilities that provide fewer resident care hours (Dyck, 2007). Malnourished elders who live in long-term care facilities and who cannot eat independently have an increased risk of remaining malnourished (Thomas, Verdery, Gardner, Kant, & Lindsay, 1991). These findings stress the importance of having adequate numbers of well-trained staff members who can assist residents with feeding difficulties.

Having appetizing food to eat has been identified as important in improving quality of life for long-term care residents (Guse & Masesar, 1999). Simmons, Cleeton, and Porchak (2009) reported that more than 60% of long-term care residents in their study complained about the food service. Serving a variety of foods increases elders' food consumption (Hollis & Henry, 2007). An elder's appetite typically increases when food is tasty and well prepared and when eaten in a pleasant environment in the company of others with whom the elder enjoys being with (Wikby & Fägerskiöld, 2004). In long-term care facilities, factors that make eating an enjoyable experience are often altered or absent. Elders living in long-term care facilities usually have limited food choices. Friends and family members are often absent during mealtimes, and seating arrangements for meals may be assigned and undesirable to the residents. Dining rooms in long-term care facilities are often noisy, and staff members often appear hurried to finish their mealtime duties.

Changes in the environment, availability, and quality of food served in long-term care facilities can help boost nutrition and appetite for residents. Changes such as snacks that are available to residents at all times, buffet or home-style meals, an ambient environment, desirable seating arrangements for residents, and better quality of food can all favorably impact nutrition and appetite in elders who live in long-term care facilities (Hollis & Henry, 2007; Remsburg et al., 2001; Simmons et al., 2008; Simmons & Levy-Storms, 2005; Wikby & Fägerskiöld, 2004).

Nutrition, Appetite, and Weight Loss

Nutrition and appetite in elderly persons are affected by multiple factors. Loss of appetite increases an elder's risk of malnutrition and weight loss (Feldblum et al., 2007; Knoop et al., 2005; Wilson et al., 2005). Tools to identify elders with nutritional deficiencies and decreased appetite are limited and not widely used (Jones, 2002). Strategies to address nutrition and appetite are essential, since nutritional deficiencies and loss of appetite can result in weight loss and poor clinical outcomes (Sullivan et al., 2002; Wilson et al., 2005).

Interventions for Alterations in Nutrition and Appetite

Interventions for elders with alterations in nutrition and appetite should be individually tailored to meet each elder's needs. Common interventions used to treat elders with nutritional deficiencies include nutritional supplements and medications to stimulate appetite.

Nutritional supplements. Nutritional supplements are the most common intervention used in long-term care facilities to treat residents with weight loss. Various types of nutritional supplements exist, but most nursing facilities use liquid supplements

that residents must drink. Tieken et al. (2007) found liquid nutritional supplements to be less satisfying to study participants than solid supplements, such as nutritional supplement bars. In a Cochrane Review regarding nutritional supplementation in elders, which included 49 trials and 4790 participants, the main conclusions were that although supplements do produce a small amount of weight gain (2.3%) in older people, they do not produce improvement in clinical outcomes (Milne, Potter, & Avenell, 2006).

Nutritional supplements are often not consumed, and guidelines for their use in long-term care facilities are often unclear (Gosney, 2003; Kayser-Jones et al., 1998; Lad, Gott, & Gariballa, 2005). Unpleasant taste and texture are common complaints from elders who receive liquid nutritional supplements (Gosney, 2003). Although the literature suggests a small benefit from the use of nutritional supplements in elders with weight loss and nutritional deficiencies, these supplements should not be considered the mainstay of treatment.

Medications to stimulate appetite. Remeron (mirtazapine) and Megace (megestrol acetate) are commonly prescribed for elders with weight loss (Fox, Treadway, Blaszczyk, & Sleeper, 2009). Although Remeron and Megace are often used in long-term care facilities to treat elders with weight loss, there is limited support for their use in the literature because their effectiveness is unclear.

Nutrition, Appetite, and Weight Assessment Tools

Many questions concerning nutrition and appetite in old age remain unanswered. The literature strongly suggests poor clinical outcomes and increased mortality risk in elders with nutritional deficiencies, and assessment tools and interventions are still being developed. Alterations in nutrition and appetite in elders is a complex phenomenon, and

they are complicated by chronic disease, illness, and changes that occur with aging (Feldblum et al., 2007). In order to implement appropriate nutritional interventions, assessment data are imperative, and in order to obtain these data, assessment tools that identify nutrition and appetite deficits are the first steps. If elders who have appetite loss can be identified, precautionary measures can be implemented to prevent further nutritional deficits and weight loss.

Although strong evidence supports the importance of identifying elders with decreased appetite and nutrition and then intervening on their behalf, assessment tools designed to accomplish this task are limited. Screening instruments to assess appetite and nutritional risk in elders are few and are rarely utilized in long-term care facilities. A gold-standard tool to assess nutritional status in elders does not exist (Donini et al., 2007), and few tools have been deemed valid and reliable for assessing nutritional risk in elders (Jones, 2002).

The Mini Nutritional Assessment

The Mini Nutritional Assessment (MNA) has been proven effective in identifying elders with increased risk of nutritional deficiencies (Guigoz, 2006; Guigoz, Lauque, & Vellas, 2002; Murphy, Brooks, New, & Lumbers, 2000; Soini, Routasalo, & Lagström, 2004). Although the MNA is considered a reliable and valid tool for identifying elders with increased nutritional risk, it is not widely used in long-term care facilities. The lack of use of the MNA can partially be explained by the time required to complete the assessment. Although Guigoz, Vellas, and Garry (1996) propose that the MNA can be performed in less than 15 minutes, the assessment involves measurements of height, weight, and arm and calf circumferences, and calculation of body mass index.

Anthropometric measurements in the MNA are the most descriptive factors for nutritional risk (Murphy et al., 2000).

Anthropometric measurements such as height can be problematic in institutionalized elders who are often unable to stand or who may have contractures that prevent accurate height measurements. Weight measurements are often inaccurate because they are taken while residents are wearing braces, splints, or prostheses; using wheelchair cushions; and/or sitting in various types of chairs. In addition to the anthropometric assessment, 15 additional questions are included in the MNA. For elders with cognitive decline or elders who have difficulty with communication, such as hearing or speech impairments, answering multiple questions can take a considerable amount of time.

Body Mass Index and Weight Measurements

Body mass index (BMI) is used to identify underweight and overweight individuals and is calculated by dividing a person's weight in kilograms by his or her height in meters squared. The National Institutes of Health (2013) identifies a person with a BMI of less than 18.5 as underweight. Low BMI has been linked to increased mortality risk in elders (Corrada, Kawas, Mozaffar, & Paganini-Hill, 2006; Seidell & Visscher, 2000; Taylor & Østbye, 2001). However, some suggest that unexplained weight loss may be more predictive of increased mortality risk than low BMI (Keller & Østbye, 2005). Although BMI does appear to be a valuable tool for identifying elders with weight issues, it is not commonly calculated for elders who live in long-term care facilities. This may be partially explained by the amount of time it takes to obtain the data required to calculate BMI.

Most long-term care facilities rely on weight measurements and meal intakes to identify residents who may need nutritional interventions. Weight measurements can be misleading and are often incorrect. Significant nutritional deficits and weight loss may go unnoticed in residents if weight measurements are only performed monthly. Elders who have had recent hospitalizations are more likely to develop nutritional deficiencies (Guigoz, 2006). Fluid retention in elders can lead to undetected weight loss and fluctuating weight measurements. Meal intakes are often overestimated and reported unreliably by nursing staff in long-term care facilities (Kayser-Jones et al., 1997; Simmons & Reuben, 2000). It is apparent that weight measurements and meal intakes should not be the only criteria used to identify elders at risk for nutritional deficiencies. Rather, these measurements and observations should be used in conjunction with other assessment tools in order to earlier identify elders who demonstrate need for nutritional interventions.

Simplified Nutritional Appetite Questionnaire

Easy-to-use tools designed to detect appetite changes in elderly persons are limited. The Simplified Nutritional Appetite Questionnaire (SNAQ) is designed to quickly assess changes in appetite. The SNAQ consists of four questions relating to appetite and is simple and easy to use (Wilson et al., 2005). Wilson et al. reported that low SNAQ scores were associated with an increased risk of significant weight loss in elderly participants. Additional studies have used the SNAQ to assess elders for appetite loss but have not evaluated its ability to predict significant weight loss in elders (Hanisah, Suzana, & Lee, 2012; Rolland, Perrin, Gardette, Filhol, & Vellas, 2012; Sties et al., 2012)

Additional studies are needed to verify the SNAQ's usefulness as an appetite assessment tool and its ability to predict significant weight loss in elders.

Appetite, Hunger, and Sensory Perception Questionnaire

The Appetite, Hunger, and Sensory Perception Questionnaire (AHSP) is a 29-item questionnaire that addresses both past and present factors relating to appetite (Mathey, de Jong, et al., 2001). Since the AHSP relies on self-reported data, use of this questionnaire may be problematic in elders with cognitive impairment, and cognitive impairment is common in elders living in long-term care facilities (Savina et al., 2003). Another limitation of the AHSP is the time required to complete the questionnaire.

In summary, few studies to date have used appetite and/or nutritional assessment tools in elders living in long-term care facilities. Yet the literature strongly suggests an increased risk of poor clinical outcomes associated with nutritional deficiencies in this population. It is difficult to develop an effective nutritional care plan without proper assessment data. Since most long-term care facilities do not have a dietitian available to perform all necessary nutritional assessments, assessment tools must be user-friendly and adaptable for use by staff members from various disciplines. Nutritional assessment tools that are brief, simple, and inexpensive need to be developed (Thorsdottir et al., 2005).

Alterations in nutrition and appetite are most often multifactorial, and a comprehensive assessment tool designed to address all these factors that is brief, inexpensive, and easy to use is improbable. Therefore, nutrition and appetite assessment tools that can be used to screen large numbers of elders quickly and easily need to be developed. Assessment data can then be used to identify elders who need more intensive evaluation. Additional research is needed to further develop nutrition and appetite

assessment tools that can identify residents at risk for nutritional deficiencies and weight loss.

The Aging Process

Physiological changes. Physiological changes affecting nutrition and appetite occur in healthy aging and are more pronounced in elders with chronic illness.

Physiological changes, such as changes in energy balance, changes in taste and smell, and gastrointestinal changes can all affect appetite and nutrition (Roberts & Rosenberg, 2006). Physiological changes that occur with aging are difficult to study since much diversity exists in the elderly population.

Energy balance. Numerous factors contribute to the maintenance of energy balance as people age. Changes in energy intake (Briefel et al., 1995), total energy expenditure (Rothenberg, Bosaeus, Westerterp, & Steen, 2000), resting metabolic rate (Klausen, Toubro, & Astrup, 1997), diet-induced thermogenesis (Visser, Deurenberg, van Staveren, & Hautvast, 1995), and physical activity (Elia, Ritz, & Stubbs, 2000) occur in healthy aging.

Energy intake. The Third National Health and Nutrition Examination Survey 2009-2010 (NHANES III) examined energy intakes in more than 14,000 persons aged 2 months to 80+ years, and findings suggest that energy intakes increase until early adulthood and then decline thereafter (Briefel et al., 1995). Food intake and hunger decline with aging (MacIntosh et al., 2001; Sturm et al., 2003; Sturm et al., 2004). The NHANES III reports that caloric intakes for those 70 to 74 years of age are, on average, 300 to 500 calories lower than for persons aged 40 to 49 years of age (Briefel et al., 1995). Females, on average, have lower caloric intakes than males in all age groups after

the age of 12 years (Briefel et al., 1995). In institutionalized elders with multiple medical diagnoses, Lammes and Akner (2006) report average daily caloric intakes of 1474 kcal.

Studies evaluating energy intake in elders often rely on self-reported data. This can be problematic for elders who have memory impairment, poor eyesight, and/or functional impairments that interfere with their ability to accurately report and record data. For elders living in long-term care facilities, energy intakes are often overestimated by staff members (Kayser-Jones et al., 1997; Simmons & Reuben, 2000). Since the elderly population is heterogeneous, and great variation exists in health-related factors, studies evaluating energy intake can be problematic (Elia et al., 2000). This variation adds to the difficulty of determining whether decreased energy intake is a direct result of aging or if other factors are responsible for these apparent declines.

Total energy expenditure. Total energy expenditure comprises three measurements: resting metabolic rate, diet-induced thermogenesis, and activity energy expenditure (AEE) (Visser et al., 1995). Most studies suggest that resting metabolic rate is responsible for 50% to 70% of total energy expenditure, whereas activity energy expenditure represents 15% to 30% of total energy expenditure, and diet-induced thermogenesis is responsible for the remaining 8% to 15% of total energy expenditure (Roberts & Rosenberg, 2006; Visser et al., 1995).

Calculation of total energy expenditure is challenging and is most accurately calculated using the doubly labeled water method (Elia et al., 2000). This method requires study participants to ingest water containing radioactive isotopes. These isotopes are then measured in participants' urine, and data collected are used to calculate total energy expenditure (Schoeller, 1999). Although the doubly labeled water method is

considered a reliable measure of total energy expenditure, Blanc et al. (2002) suggest that it is less effective in elderly persons due to urinary retention that occurs frequently in elders.

If total energy expenditure exceeds energy intake, weight loss and/or nutritional deficiencies may result; if energy intake exceeds total energy expenditure, weight gain may occur. Evidence suggests that total energy expenditure declines with aging (Elia et al., 2000; Pannemans & Westerterp, 1995; Roberts & Dallal, 2005). Explanations for these declines include decrease in physical activity, decrease in metabolically active tissues, and increased incidence of disease and disability (Blanc et al., 2004; Elia et al., 2000; Roberts & Dallal, 2005).

Resting metabolic rate. Resting metabolic rate, resting energy expenditure, and basal metabolic rate are all terms used in the literature to refer to a person's metabolic rate at rest. For this dissertation the metabolic rate at rest will be referred to as *resting metabolic rate*. Strong evidence exists that resting metabolic rate decreases with age in healthy subjects (Elia et al., 2000; Klausen et al., 1997; Vaughan, Zurlo, & Ravussin, 1991; Visser et al., 1995). The reason for decline in resting metabolic rate with aging is still being explored. Evidence suggests that decline in resting metabolic rate with aging may be linked to loss of metabolically active fat-free mass (Bosy-Westphal et al., 2003; Klausen et al., 1997; Lammes & Akner, 2006). Other plausible explanations for decreased resting metabolic rate with aging include increased incidence of illness and decreased physical activity (Starling & Poehlman, 2000).

Diet-induced thermogenesis. Diet-induced thermogenesis is defined in the literature as an “increase in energy expenditure above the basal fasting level divided by

the energy content of the food ingested” (Westerterp, 2004, p. 1). Diet-induced thermogenesis is also referred to in the literature as the *thermic effect of feeding* (Roberts & Dallal, 2005). A respiration chamber is used to measure diet-induced thermogenesis, and in most studies, a ventilated hood system is used (Rothenberg et al., 2000). This type of system enables researchers to measure and analyze participants' O₂ uptake as well as the amount of CO₂ expelled. Resting metabolic rate measurements are collected from participants in fasting and resting states. Once resting metabolic rate is calculated, nutrients are administered and participants' O₂ uptake and expelled CO₂ are measured for a specific period of time, and these data are used to calculate diet-induced thermogenesis (Das et al., 2001; Klausen et al., 1997; Visser et al., 1995). Most studies suggest no change in diet-induced thermogenesis with aging (Das et al., 2001; Vaughan et al., 1991; Visser et al., 1995). Some report that the type of nutrients ingested affects diet-induced thermogenesis, and that protein intake is an important regulator of diet-induced thermogenesis (Westerterp, 2004; Westerterp, Wilson, & Rolland, 1999).

Activity energy expenditure. Activity energy expenditure decreases with age (Bennet, 1998; Elia et al., 2000; Klaussen et al., 1997; Pannemans & Westerterp, 1995). Decreases in physical activity with aging can be at least partially explained by decreases in functional ability and increased illness that occur in old age (Elia et al., 2000). However, elders may expend more energy than their younger counterparts on daily activities such as walking (Voorrips, van Acker, Deurenberg, & van Staveren, 1993), and activity energy expenditure may be increased in elders with memory impairment who may wander and walk excessively (Miyoshi et al., 2008). Activity energy expenditure is difficult to estimate, and energy required for activities can vary significantly among

subjects. Declines that occur with aging, such as declines in muscle strength and mass, may impact the amount and type of activity an elder is able to perform.

Although changes in energy balance occur with aging, the significance of these changes is unclear. Energy balance is maintained in healthy aging. The literature suggests that energy intake decreases in old age (Alam et al., 2011); however, energy expenditure through physical activity also declines (Roberts & Dallal, 2005). Metabolic changes that occur as a result of disease states may make a more significant contribution to alterations in nutrition and appetite that occur in old age (Elia et al., 2000). Additional research studies are needed to further clarify the role of energy balance changes in aging and their relationship to nutrition and appetite.

Changes in taste and smell. Taste and smell play important roles in appetite and nutrition. Evidence suggests that elderly persons perceive flavors in foods to be less intense than do their younger counterparts (Fukunaga, Uematsu, & Sugimoto, 2005; Koskinen, Kälviäinen, & Tuorila, 2003a; Kremer, Bult, Mojet, & Kroeze, 2007; Mojet, Heidema, & Christ-Hazelhof, 2003). Some researchers (Kremer et al., 2007), but not all (Zallen, Hooks, & O'Brien, 1990), report decreased perceptions of salty tastants among elderly subjects when compared with younger counterparts. The ability to discriminate between intensity of tastants may be related to the products in which they are dissolved. Mojet et al. (2003) found that tastants dissolved in water were perceived as less intense by older participants when compared with younger participants; however, when the tastants were dissolved in more complex products, only salty and sweet tastants were reported as less intense by older participants. Mojet et al. (2003) found that when participants applied a nose clip prior to tasting products, only the intensity of salty

products was diminished for the older participants when compared with the younger participants. This suggests that changes in taste are directly related to changes in smell. Additional factors that can contribute to changes in elders' taste include smoking, dental problems, medications, and illness (Winkler, Garg, Mekayarajjananonth, Bakaeen, & Khan, 1999).

Although the literature suggests that taste sensitivity declines with aging, flavor enhancement of food as a nutritional intervention requires additional research. Most studies report little effect on palatability or food intake with flavor-enhanced foods in the elderly population (Essed, van Staveren, Kok, & de Graaf, 2007; Koskinen, Kälviäinen, & Tuorila, 2003b; Kremer et al, 2007), but a few studies do report increased satisfaction and increased food intake with flavor-enhanced foods (Mathey, Siebelink, de Graaf, & van Staveren, 2001; Schiffman & Warwick, 1993). Elders are thought to have fewer taste buds than their younger counterparts; however, further studies are needed to confirm the significance of this finding (Kano, Shimizu, Okayama, & Kikuchi, 2007).

Strong evidence that the sense of smell declines with aging exists (Koskinen et al., 2003a; Kremer et al., 2007; Murphy et al., 2002). Prevalence of olfactory impairment in those over age 80 has been reported to range between 62% and 80% (Doty et al., 1984; Murphy et al., 2002). Although the literature suggests that olfactory deficits are common in elders, how this affects taste and food intake remains unclear (Koskinen et al., 2003a; Kremer et al., 2007). Factors such as diseases, medications, and cognitive impairment can contribute to olfactory deficits in old age; thus it is difficult to determine how much olfactory impairment results from aging alone (Koskinen et al., 2003b). Additional

studies are needed to define the roles of taste and smell and how they correlate with nutrition and appetite in elders.

Gastrointestinal changes. Changes within the gastrointestinal tract occur with healthy aging; however, it is unclear if these changes have any significant effect on nutrition and appetite. Some report slower gastric emptying rates in healthy elders when compared with younger counterparts (Broghna, Ferrara, Bucceri, Lanteri & Catalano, 1999; Broghna et al., 2006; Clarkston et al., 1997; O'Donovan et al., 2005; Shimamoto et al., 2002), whereas others report no differences in gastric emptying rates (Madsen & Graff, 2004; Sturm et al., 2004). Some (Madsen & Graff, 2004; Shimamoto et al., 2002), but not all (Clarkston et al., 1997), report slower colonic transit times in older participants when compared with younger ones. Conflicting results from studies designed to examine gastrointestinal changes that occur with healthy aging can be at least partially explained by the small number of studies available, small study sample sizes, and variable study techniques. Disease states that occur in old age have a greater impact on gastrointestinal changes than do the changes that occur as a result of healthy aging (O'Mahony, O'Leary, & Quigley, 2002).

Hormones produced in the gastrointestinal (GI) tract play significant roles in appetite regulation. Hormones produced in the GI tract act within the GI tract and also within the brain (Pannacciulli et al., 2007). Many types of hormones, peptides, and proteins produced in the GI tract affect nutrition and appetite; however, this paper will limit discussion to the following: cholecystokinin, ghrelin, and leptin.

Cholecystokinin (CCK) is a hormone released in the GI tract in response to nutrient intake (Brennan et al., 2008; Kissileff, Carretta, Geliebter, & Pi-Sunyer, 2003).

CCK has a satiating effect and plays a role in the termination of eating (Brennan et al., 2008; Kissileff et al., 2003). A few small studies have reported appetite suppression with intravenous administration of CCK-8 (Brennan et al., 2008; MacIntosh et al., 2001). Some (MacIntosh et al., 2001; Sturm et al., 2003; Sturm et al., 2004), but not all (Serra-Prat, Palomera, Clave, & Puig-Domingo, 2009), have reported increased CCK levels in elders when compared with younger counterparts. CCK appears to play a role in anorexia and weight loss that frequently occur in patients with late-stage cancer (Ramos et al., 2004). CCK is thought to interact with other GI hormones in appetite regulation and signal the brain to terminate eating (Brennan et al., 2008; Kissileff et al., 2003).

Ghrelin is produced primarily in the stomach and acts centrally within the brain to increase food intake (Cummings et al., 2001; Laferrère, Abraham, Russell, & Bowers, 2005; Serra-Prat et al., 2009). Some have reported that ghrelin levels are influenced by gender, fat mass (Greenman et al., 2004; Makovey, Naganathan, Seibel, & Sambrook, 2007), and age (Bauer et al., 2007; Cummings et al., 2001; Makovey et al., 2007). Tschöp, Smiley, and Heiman (2000) reported increases in food intake in rodents after receiving intracerebroventricular ghrelin injections, and increased food intake in humans has been reported after peripheral injections of ghrelin (Ashby et al., 2009; Druce et al., 2005; Laferrère et al., 2005). Cummings et al. found study participants had increased ghrelin levels before meals and decreased levels after food intake, suggesting that ghrelin plays a role in appetite regulation.

Lower ghrelin levels have been reported in undernourished elders when compared with well-nourished elders and younger participants (Sturm et al., 2003). However, in a study comprising healthy elders, ghrelin levels responded appropriately to decreased and

increased nutrient intake (Yukawa et al., 2006). A more recent study suggests that in frail elders, ghrelin levels do not respond normally to nutrient intake (Serra-Prat et al., 2009). Although limited information exists on the role of ghrelin in appetite regulation, the available studies suggest that ghrelin stimulates appetite and increases nutrient intake. The possibility exist that decreased ghrelin levels in frail elders may play a role in anorexia that often occurs in old age and during periods of illness.

Leptin is released from adipose tissue and acts within the brain to decrease food intake (Hubbard, O'Mahony, Calver, & Woodhouse, 2008). Leptin levels appear to rise as fat mass increases (Hubbard et al., 2008; Ostlund, Yang, Klein, & Gingerich, 1996). Some have reported increased leptin levels in healthy elders when compared with their younger counterparts (Francesco et al., 2006), whereas others have reported decreased leptin levels in elders (Cederholm, Arner, & Palmblad, 1997; Hubbard et al., 2008; Ostlund et al., 1996). Francesco and colleagues suggest that imbalances between leptin and ghrelin in elders may at least partially explain nutritional deficits that often occur in old age. Studies to date exploring leptin's role in anorexia of aging are limited. Studies that are available have small sample sizes and conflicting results; therefore, additional studies are needed to clarify leptin's role in appetite regulation.

In summary, CCK, ghrelin, and leptin all play important roles in appetite regulation, and additional appetite-regulating hormones, peptides, and proteins continue to be identified (Perboni & Inui, 2010). The literature suggests that disruption of hormones involved in appetite regulation may occur in frail elders (Hubbard et al., 2008; Moller, O'Brien, & Nair, 1998; Serra-Prat et al., 2009). The appetite regulation system is

complex, and further investigation is required to better understand this complicated system and how it relates to appetite and nutrition in elders.

Changes in functional status. Age increases an elder's risk of illness, and illness may lead to functional impairment (Agüero-Torres et al., 1998). Functional impairment is often defined as an elder's inability to perform activities of daily living. Although physiological changes associated with healthy aging play a role in nutrition and appetite in elders, factors associated with illness and decreased functional ability play even greater roles. Functional impairments increase an elder's risk of death (Fried et al., 1998; Inouye et al., 1998; Saliba et al., 2001) and decrease an elder's likelihood of independent living (Young, 2009). Although some functional changes occur with healthy aging, most functional changes that contribute to alterations in nutrition and appetite are related to disease states and chronic illnesses (Wensing, Vingerhoets, & Grol, 2001). Functional decline and chronic illnesses occur frequently in elders and often occur simultaneously (Cigolle, Langa, Kabeto, Tian, & Blaum, 2007; Lee, Go, Lindquist, Bertenthal, & Covinsky, 2008; Olin et al., 2005; Wensing et al., 2001). Improvement in functional ability does occur in elders after acute events such as hospitalizations, but improvement occurs less often in those over age 80 (Mor, Wilcox, Rakowski, & Hiris, 1994), and rarely occurs in elders who are unable to live independently (Richardson et al., 2001).

Many types of functional impairments contribute to alterations in nutrition and appetite in elderly persons. These conditions include but are not limited to loss of muscle mass and strength, difficulties with chewing and/or swallowing, tremors, arthritis and other musculoskeletal conditions, and acute events such as injury and stroke. Assessment of functional status is often determined by assessment of an elder's ability to perform

activities of daily living (ADLs). According to the National Nursing Home Survey: 2004 Overview, 98% of residents living in long-term care facilities required assistance with their ADLs (Jones, Dwyer, Bercovitz, & Strahan, 2009). Included in ADLs is the ability to obtain, prepare, and chew and swallow food, all of which are necessary to maintain adequate nutrition (Berkhout et al., 1998; Suominen et al., 2005). Elders who live in long-term care facilities and who are dependent on others for assistance with feeding have an increased risk of nutritional deficiencies and weight loss when compared with those who eat independently (Blaum, Fries, & Fiatarone, 1995). Elders who are dependent on others for ADLs have poorer nutritional status and increased incidence of chronic illness (Huang, Wueng, Ou, Cheng, & Su, 2001).

Loss of skeletal muscle mass and strength has been shown to occur in healthy elders after age 60 (Frontera et al., 2000; Janssen, Heymsfield, Wang, & Ross, 2000; Kyle et al., 2001). Muscle mass loss may occur in elders who do not experience weight loss (Gallagher et al., 2000). Decreased muscle mass and strength in elders is associated with increased functional impairment (Delmonico et al., 2007; Janssen, Heymsfield, & Ross, 2002) and contributes to the inability to perform ADLs (Janssen et al., 2002).

Chewing and swallowing difficulties are common in elders who live in long-term care facilities and can lead to difficulties with eating (Blaum et al., 1995; Gilmore, Robinson, Posthauer, & Raymond, 1995). Most institutionalized elders do not have their natural teeth and may not have dentures to help with chewing (MacEntee, Weiss, Waxier-Morrison, & Morrison, 2006). Dentures can be problematic since they may not fit correctly or may be in poor condition (Marshall, Warren, Hand, Xie, & Stumbo, 2002; Mojon, Budtz-Jørgensen, & Rapin, 1999). Oral care is often neglected in elders who live

in long-term care facilities (Wårdh, Hallberg, Berggren, Andersson, & Sörensen, 2000), and there exists a strong association between poor oral health and nutritional deficiencies (Andersson, Westergren, Karlsson, Hallberg, & Renvert, 2002; Marshall et al., 2002; Mojon et al., 1999). Weight loss in elders has been reported in those who have difficulty chewing and/or feeding themselves (Berkhout et al., 1998; Gilmore et al., 1995). Chewing and swallowing difficulties can necessitate a modified diet, such as pureed foods or food and/or liquids with added thickeners, which may be less appetizing than a regular diet (Kumlien & Axelsson, 2002).

Difficulty swallowing (dysphagia) increases an elder's risk of nutritional deficiencies and weight loss. One study reported that 80% of residents with previous stroke had difficulty eating, and 25% of those were reported to have dysphagia (Kumlien & Axelsson, 2002). History of stroke and arthritic conditions are most predictive of functional disability in elderly persons (Furner, Rudberg, & Cassel, 1995). The risk of stroke increases with age, and stroke is more common in women than in men. Women who have strokes are at higher risk for disability than their male counterparts (Kelly-Hayes et al., 2003). Elders who have history of stroke often require assistance with meals and may have difficulty with independent eating (Kumlien & Axelsson, 2002). Being dependent on others for feeding increases an elder's risk of nutritional deficiencies and weight loss.

Musculoskeletal conditions such as arthritis are common in elderly persons and are associated with increased functional dependence. Musculoskeletal disorders can make proper positioning for meals difficult and may interfere with an elder's ability to transport food to the mouth (Westergren, Unosson, Ohlsson, Lorefält, & Hallberg, 2002). Injuries

such as fractures can limit an elder's ability to perform ADLs, such as preparing and eating food, and this may increase nutritional risk (Wolinsky, Fitzgerald, & Stump, 1997).

Dementia

Dementia is a progressive disease that occurs due to damage to brain cells and results in cognitive impairment (Alzheimer's Association, 2013). Dementia is a strong predictor of institutionalization in elders (Bharucha et al., 2004; Young, 2009). Several types of dementia exist. The most common types include Alzheimer's dementia, vascular dementia, mixed dementia, dementia with Lewy bodies, normal-pressure hydrocephalus, and frontotemporal dementia (Alzheimer's Association). Alzheimer's disease is the most common form of dementia, comprising 60% to 80% of all dementias (Alzheimer's Association). Studies often do not differentiate between types of dementia; therefore, the term *dementia* will be used to identify all types of dementia in this dissertation.

Dementia is a common diagnosis found in elders, and prevalence increases with age (Hebert, Scherr, Bienias, Bennett, & Evans, 2003). Weight loss and nutritional deficiencies are common findings in elders with dementia (Guérin et al., 2005; Guérin et al., 2009; Hansen, Waldorff, & Waldemar, 2011; Suominen et al., 2005; White, Pieper, & Schmader, 1998). Gradual weight loss occurs in healthy aging and occurs more frequently in those with dementia (Johnson, Wilkins, & Morris, 2006). Some have reported increased weight loss in elders as dementia progresses (Guérin et al., 2005; White et al., 1998), whereas others have reported no increased weight loss with progression of the disease (Cronin-Stubbs et al., 1997). Weight loss in elders with dementia increases the risk of death (White et al., 1998). Several studies suggest that

weight loss precedes the diagnosis of dementia and that weight loss occurs to a greater degree at the time of diagnosis of the disease (Hughes, Borenstein, Schofield, Wu, & Larson, 2009; Johnson et al., 2006; Knopman, Edland, Cha, Petersen, & Rocca, 2007; Stewart et al., 2005).

A number of factors may contribute to nutritional deficiencies and weight loss in elders with dementia. These include but are not limited to low food intake, increased physical activity, inability to feed themselves, lack of qualified feeding assistance, decreased appetite, forgetting to eat, and lack of appropriate diet.

Low food intake has been reported in 45% to 50% of long-term care facility residents who have dementia, and it is believed to be a major contributing factor to weight loss in those with dementia (Reed, Zimmerman, Sloane, Williams, & Boustani, 2005; Simmons et al., 2002). Increased physical activity such as confused walking may contribute to weight loss in those with dementia. Miyoshi et al. (2008) found that participants with dementia who walked more than 1.2 miles daily lost weight; however, participants who walked less than 1.2 miles daily gained weight. However, because study participants were institutionalized, it is unclear whether additional food was available for those who walked more.

Dementia may interfere with an elder's ability to eat independently, which increases his or her risk of nutritional deficiencies and weight loss (Berkhout et al., 1998). Staff involvement and monitoring during meal times has been shown to improve food intake in elders with dementia (Reed et al., 2005). Dementia patients often have impaired communication skills and need frequent reminders to eat. Elders with dementia may not recognize food or may not remember how to get the food into their mouths.

Although difficulty with feeding is a well-recognized problem for elders with dementia, studies addressing interventions for these difficulties are few, and most of the studies that are available have design flaws and small sample sizes (Chang & Roberts, 2008; Watson & Green, 2006).

Depression

Depression is a psychological disorder common in elders, and the incidence of depression is increased in elders who live in long-term care facilities when compared with their community-dwelling counterparts (Abrams, Teresi, & Butin, 1992; Jongenelis et al., 2004). Depression increases an elder's risk of institutionalization (Onder et al., 2007; Young, 2009). Elders living in long-term care facilities have increased incidence of comorbid conditions and functional impairments, both of which have been shown to increase the risk of depression (Eisses et al., 2004; Kaup et al., 2007). Webber and colleagues (2005) reported that elders with a diagnosis of depression had decreased functional abilities when compared with their peers who were not depressed. Prevalence of depression in elders in long-term care facilities has been reported to range between 22% and 48% (Kaup et al., 2007; Levin et al., 2007; Thakur & Blazer, 2008). Studies reporting prevalence of depression in long-term care residents may be difficult to interpret due to different definitions and methods of diagnosis used to identify depression in elders. Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) criteria used to diagnose major depression include identifying symptoms relating to depressed mood, loss of interest, increased fatigue, weight loss, insomnia, suicidal thoughts, and behavior changes and/or feelings of worthlessness that persist for most of

the time over a 2-week period (Thakur & Blazer). The DSM-IV does not clearly specify criteria for diagnosis of minor depression.

A second diagnostic tool considered a valid and reliable tool for diagnosing elders with depression is the Geriatric Depression Scale (GDS) (Gerety et al., 1994; Leshner, 1986; Yesavage et al., 1983). The GDS-30 consists of 30 questions and has several shortened forms containing 15, 12, 10, and 8 questions (GDS-15, GDS-12, GDS-10, GDS-8, respectively). In a recent study, the GDS-30, GDS-15, and GDS-8 were all found to be satisfactory screening tools for identifying depression in long-term care residents (Smalbrugge, Jongenelis, Pot, Beekman, & Eefsting, 2008). In a small study (n = 51) of nursing home residents, Leshner (1986) reported 100% specificity and 80% sensitivity when a cutoff score of 14 was used on the GDS-30, and Jongenelis et al. (2005) reported similar findings with a cutoff score of 11 on the GDS-30.

Elders who have dementia often have an atypical presentation of depression, and the GDS appears to be less effective in identifying depression in elders who have moderate to severe dementia (McGivney, Mulvihill, & Taylor, 1994). The Cornell Scale for Depression in Dementia (CSDD) is a 19-item questionnaire designed to be used with elders who have dementia. One of the advantages of the CSDD is that it can be administered to the caregiver rather than to the person with dementia. Similar rates of depression have been reported in elders with and without dementia (Kaup et al., 2007). Payne et al. (2002) reported a reduction in depression in elders with dementia during the first year after admission to a long-term care facility. These findings might be partially explained by appropriate diagnosis and treatment of depression after admission to the long-term care facility.

Depression can be difficult to diagnose and may be overlooked or felt to be normal for elders, especially for those who live in long-term care facilities. Bagley et al. (2000) reported that nurses identified less than one third of residents who were depressed according to the GDS-15 and that 98% of staff members employed by 30 different long-term care facilities reported having no in-service training related to depression. In a similar study, fewer than half of residents diagnosed with depression by psychiatric professionals were identified as depressed by nursing care staff (Teresi, Abrams, Holmes, Ramirez, & Eimicke, 2001). The literature suggests that nurses and nurse's assistants poorly recognize depression in elders (Brühl, Luijendijk, & Muller, 2007). Although it appears that depression is often under diagnosed (Licht-Strunk, Beekman, de Haan, & van Marwijk, 2009; Smoliner et al., 2009), this trend may be improving. After reviewing Minimum Data Set (MDS) data for over 75,000 long-term care residents, Levin et al. (2007) concluded that almost 50% of long-term care residents had a diagnosis of depression and that nearly 75% of those diagnosed were treated. Improvement in diagnosis and treatment of depression may at least be partially explained by the increased availability of tools such as the GDS and the CSDD.

Nutritional deficits have been found to occur more frequently in elders with depression (Cabrera, Mesas, Garcia, & de Andrade, 2007; German et al., 2008). Both increased and decreased appetites have been reported in those diagnosed with depression. After review of the First National Health and Nutrition Examination Survey data, DiPietro, Anda, Williamson, and Stunkard (1992) reported that, during an 8-year follow-up period, those aged 55 and older who reported depression had increased weight loss when compared with their non-depressed counterparts. Loss of appetite has been reported

to occur more frequently in elders who are depressed (German et al., 2008; Smoliner et al., 2009). Koster et al. (2010) reported that weight loss and weight gain in older adults were associated with depression. The relationship between impaired nutrition and depression is difficult to determine since impaired nutrition may contribute to depression and depression may contribute to impaired nutrition (Smoliner et al.).

The primary treatment for elders with depression is antidepressant medications (Thakur & Blazer, 2008). Antidepressant medications are easy to administer, have acceptable side effect profiles, and are cheaper than other types of treatment. Other types of treatment for depression, such as cognitive behavior therapy and psychotherapy, are effective but are used less often mainly due to their limited availability and increased cost (Cuijpers, van Straten, & Smit, 2006; Konnert, Dobson, & Stelmach, 2009; Pinquart, Duberstein, & Lyness, 2006). Although depression is common in residents who live in long-term care facilities, treatment is often inadequate. After reviewing MDS data for more than 42,000 long-term care residents, Brown, Lapane, and Luisi (2002) concluded that more than half of residents with depression were inadequately treated. Diagnosis and treatment of depression in residents living in long-term care facilities can lower nutritional risk and should be considered important objectives.

Chronic Illness

Elders have an increased incidence of chronic illness (Aguero-Torres et al., 1998; Yang, Bishai, & Harman, 2008). Nutritional deficiencies and illness often occur concurrently in elderly persons (Mowé, Bohmer, & Kindt, 1994). Illness generally affects appetite negatively, and this is true even with mild illness (Wikby & Fägerskiöld, 2004). Weight loss in old age is associated with increased rates of disease (Knudtson, Klein,

Klein, & Shankar, 2005). Chronic illnesses that commonly affect appetite and weight maintenance in elders include but are not limited to diabetes, congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), dementia, and depression (Olin et al., 2005; Yang et al., 2008). Cardiovascular diseases such as CHF, hypertension, and stroke are common diagnoses in elderly persons and may have a direct effect on appetite and nutrition in elders (Gottdiener et al., 2000; Lloyd-Jones et al., 2009).

Diabetes is a common chronic illness in elderly persons, and the incidence of diabetes is increasing (Mokdad et al., 2000; Sloan, Bethel, Ruiz, Shea, & Feinglos, 2008). Recently the Centers for Disease Control and Prevention (2011) reported that approximately 26.9% of adults 65 years and older have diabetes. Obesity is a significant risk factor for developing diabetes (Mokdad et al., 2000; Saydah, Fradkin, & Cowie, 2004). Proper management of diabetes requires nutritional modifications and diet adherence in order to maintain lipid and glycemic control. Diabetic diets can be difficult to follow, especially for elders with limited resources.

Diabetics who lose weight intentionally through increased physical activity and dietary compliance have beneficial outcomes, whereas unintentional weight loss increases the risk of death (Gregg, Gerzoff, Thompson, & Williamson, 2004). Dietary compliance, lipid management, weight maintenance, and blood pressure control are important factors in preventing complications of diabetes (American Diabetes Association, 2011). According to the National Health and Nutrition Examination Survey (NHANES) 2009-2010, diabetes diagnoses have increased from 5 million to 19 million in the last 29 years. NHANES data for the last 12 years report significant increases in hypertension, hyperlipidemia, and obesity in diabetics. These findings suggest that many

diabetics do not manage their risk factors for increased disease complications effectively. Diabetes increases the risk of cardiovascular complications such as CHF (Dahlström, 2005), and CHF can result in decreased appetite and weight loss in elders (Azhar & Wei, 2006). Ineffective management of diabetes increases the risk of cardiovascular disease and death (Bertoni et al., 2002; Bethel, Sloan, Belsky, & Feinglos, 2007; Wei, Gaskill, Haffner, & Stern, 1998).

Hypertension, or high blood pressure, is a significant contributing factor for cardiovascular disease and is also found commonly in diabetics (Saydah et al., 2004). Poorly controlled hypertension increases an elder's risk of stroke, heart attack, and CHF (Gottdiener et al., 2000). Nutritional interventions, such as a diet high in fruits and vegetables and low in fat, have been shown to decrease blood pressure (Appel et al., 1997). The DASH diet (Dietary Approaches to Stop Hypertension) includes high fruit, vegetable, and whole grain intake and low fat intake and lowers lipids and blood pressure (Lopes et al., 2003; Obarzanek et al., 2001). Limiting salt intake by those who are salt sensitive can be an important intervention in those with hypertension (Jiang, Whelton, Appel, Charleston, & Klag, 2000). Elders with hypertension have an increased risk of developing cardiovascular comorbidities such as CHF (Dahlström, 2005), which can result in alterations in nutrition and appetite.

Congestive heart failure is a common diagnosis in elderly persons. According to the American Heart Association Heart Disease and Stroke Statistics (2009), the incidence of heart failure increases with age and occurs in greater than 60% of persons 85 years and older. Incidence of CHF is increased in elders with diabetes (Bertoni et al., 2004; Bethel

et al., 2007). Hypertension, diabetes, and smoking increase the risk of heart failure in the elderly (Gottdiener et al., 2000; Lloyd-Jones et al., 2009; Schocken et al., 2008).

Progressive weight loss and nutritional deficits that occur in persons with heart failure are often referred to as cardiac cachexia (Azhar & Wei, 2006). Increased caloric requirements have been reported in people with chronic CHF when compared with their healthy counterparts. It is hypothesized that increased caloric requirements may contribute to weight loss that often accompanies severe heart failure (Pasini, Opasich, Pastoris, & Aquilani, 2004). Clinical exacerbation of heart failure is often accompanied by edema. Weight loss may be masked by fluid retention, and diuretics used to treat edema in those with heart failure can contribute to inaccuracies in weight measurements.

Nutritional interventions such as limiting fluid and sodium intakes have been shown to reduce edema, increase activity levels, and improve quality of life in elders with heart failure (Ramirez et al., 2004). The DASH diet may reduce the risk of exacerbation of heart failure in elderly women (Levitan, Wolk, & Mittleman, 2009). Additional studies are needed to further explore the etiology of weight loss in elders with severe heart failure and the role of nutritional interventions to decrease nutritional risk.

Another chronic illness that often results in nutritional deficiencies and weight loss in elders is chronic obstructive pulmonary disease (COPD), which is characterized by breathing difficulty that worsens over time. The main risk factor for developing COPD is smoking (Global Initiative for Chronic Obstructive Lung Disease, 2013; Lindberg et al., 2006). COPD is a common chronic illness found in elderly persons and is the fourth leading cause of death in the United States (Hurd, 2000). Low body weight and loss of muscle mass is a common finding in elders with COPD (Budweiser et al., 2008;

Odencrants, Ehnfors, & Ehrenberg, 2008; Schols, Broekhuizen, Weling-Scheepers, & Wouters, 2005; Soler, Sánchez, Román, Martínez, & Perpiñá, 2004). Recent studies report malnutrition ranging from 19% to 46% of elders with COPD (Odencrants et al., 2008; Soler et al., 2004). The etiology of malnutrition and weight loss in those with COPD is unclear, but it appears to be multifactorial (Odencrants et al., 2008). Weight loss and low body weight in elders with COPD may be partially explained by hormonal and inflammatory changes that occur as a result of the disease (Koehler et al., 2007). Symptoms such as bloating, feeling full quickly, fatigue, changes in appetite, and coughing during meals have been reported as contributing factors in decreased food intake in elders with COPD (Odencrants, Ehnfors, & Grobe, 2005). Grönberg and colleagues reported that 50% of study participants with severe COPD reported at least one dietary problem (Grönberg, Slinde, Engström, Hulthén, & Larsson, 2005). Weight loss is thought to be associated with exacerbation of COPD (Hallin, Koivisto-Hursti, Lindberg, & Janson, 2006; Pouw et al., 2000). Poor response to nutritional support, such as the addition of nutritional supplements, has been reported in elders with COPD (Creutzberg, Schols, Weling-Scheepers, Buurman, & Wouters, 2000; Ferreira, Brooks, Lacasse, Goldstein, & White, 2005). However, weight gain in those with COPD may increase survival rates (Schols, Slangen, Volovics, & Wouters, 1998), and weight loss has been reported to increase mortality (Hallin et al., 2007). Additional research is needed to explore the etiology of nutritional deficiencies, appetite loss, and weight loss that occur in elders with COPD and how best to treat these deficiencies.

Acute Illness

Elderly persons with acute illness such as fractures, infections, and stroke are at increased risk of nutritional deficiencies, prolonged hospital stays, and death (Azad, Murphy, Amos, & Toppan, 1999; Stratton et al., 2006). In addition, mortality in elders with nutritional deficiencies continues to be increased in the year following hospital discharge (Longjian, Bopp, Roberson, & Sullivan, 2002; Sullivan, Walls, Lipschitz, 1991). Only about 30% of elders who are admitted to long-term care facilities after hospitalization recover to their previous functional state (Gill, Gahbauer, Han, & Allore, 2009). Therefore, it is imperative that a nutritional assessment be performed on elders who are acutely ill or those who have been recently hospitalized.

Medications

Medications used to treat illness can both increase and decrease appetite in elders. According to the National Nursing Home Survey: 2004 Overview, greater than 47% of residents living in long-term care facilities receive nine or more medications daily (Jones et al., 2009). Medication side effects, such as nausea, vomiting, diarrhea, constipation, and lethargy may all impact appetite and nutrition in elders (Sloane et al., 2008). For elders who live in long-term care facilities, risk of adverse drug reactions increases with their number of daily medications (Field et al., 2001). Some of the most common medications taken by elders that affect nutrition and appetite include antidepressants, opioids, antipsychotics, anticonvulsants, and anticholinergic medications (Sloane et al., 2008).

Antidepressants can increase or decrease weight and/or appetite (Fava, 2000; Rigler et al., 2001; Thomas, Hazif-Thomas, & Clement, 2003). In a recent meta-analysis

relating to weight change and antidepressant therapy, Serretti and Mandelli (2010) report that some antidepressants induce weight gain, others induce weight loss, and some are weight neutral. In elders with dementia, Thomas et al. (2003) reported that elders with a diagnosis of dementia who received antidepressant medications had weight gain, whereas those who did not experienced weight loss.

Remeron (mirtazapine) and Megace (megestrol acetate) are commonly prescribed for elders with weight loss (Fox et al., 2009). Remeron is an antidepressant, and Megace is an antineoplastic drug, and both have the side effect of weight gain. Although these drugs are commonly used for elders with weight loss, they are not approved by the Food and Drug Administration (FDA) for this indication (Fox et al.).

Megace is thought to increase appetite in some elders with nutritional deficits. One study reported increased appetite in elders treated with Megace (Yeh et al., 2000), whereas another study reported no benefit (Reuben, Hirsch, Zhou, & Greendale, 2005). Few studies that focus on Megace as an appetite stimulant were identified, and available studies have small sample sizes.

Remeron is also used in long-term care residents to treat weight loss; however, studies addressing this practice are lacking. In a small study of 25 long-term care residents, Goldberg (2002) reported a mean weight gain of 2.6 pounds in residents who were treated with Remeron for diagnosis of dementia and depression over a 4-month period.

Although Megace and Remeron are often used in long-term care facilities to treat elders with weight loss, limited support for their use exists in the literature. Bodenner et al. (2007) reported an increased risk of death in elderly nursing home residents treated

with Megace for weight loss. Therefore, benefit versus risk should be weighed before prescribing these medications to elders with weight loss. Additional studies are needed to explore the use of Megace and Remeron in elders with appetite loss and weight loss.

Gender

The older population is growing at a faster rate than the younger population (US Census Bureau, 2010). According to the 2004 National Nursing Home Survey, 71.2% of elders living in long-term care facilities are women (Jones et al., 2009). There are fewer men than women in the United States; however, men are living longer (US Census Bureau). This means that increased numbers of elders will potentially require long-term care, and that more men will be living in long-term care facilities in the future.

Summary

Alterations in nutrition and appetite are common in elders living in long-term care facilities. These alterations can lead to weight loss that increases an elder's risk of death. Multiple factors are often responsible for alterations in nutrition and appetite in elders, and a comprehensive assessment by the entire health care team is required. The nutritional literature is fragmented, and studies addressing nutrition, appetite, and weight loss in long-term care facilities are limited. In addition, assessment tools and interventional strategies for addressing these issues are limited. Nutritional assessment tools are not widely used in long-term care facilities, and few validated tools exist. Additional research is needed to further explore nutrition and appetite as it relates to weight loss in elders living in long-term care facilities. This research seeks to validate an appetite assessment tool in elders living in long-term care facilities, and to further explore factors contributing to poor appetite and weight loss in elders.

CHAPTER III

Methods

In this chapter, the research design and research questions are presented. Operational definitions, sample, setting, and data collection procedures are described. The chapter also includes the data analysis process and procedures for protection of human subjects.

Research Design

This research uses a descriptive design to investigate the reliability, and measurement properties of the Simplified Nutritional Appetite Questionnaire (SNAQ), a self-reported appetite assessment tool. The main purpose of this research is to determine if the SNAQ is a reliable, valid, sensitive, and specific appetite assessment tool for identifying significant weight loss in residents living in long-term care facilities. The research also is designed to examine the associations between the socio-demographic variables of age and gender and the health status characteristics of dementia, depression, acute illness, chronic illness, and medications and appetite and weight loss among the participants.

Research Questions

This study is designed to answer the following research questions:

1. What is the internal consistency reliability of the SNAQ?
2. What is the sensitivity and specificity of the SNAQ in detecting significant weight loss of $\geq 5\%$ each month as well as over 6 months among participants?

3. Is there an association between poor appetite measured by the SNAQ and significant weight loss of $\geq 5\%$ each month as well as over 6 months among participants?
4. Are there significant correlations between poor appetite measured by the SNAQ and the variables socio-demographics (age and gender) and health status characteristics (dementia, depression, acute illness, chronic illness, and medications) among participants?
5. Are there significant correlations between significant weight loss and the variables socio-demographics (age and gender) and health status characteristics (dementia, depression, acute illness, chronic illness, and medications) among participants?

Operational Definitions

The following definitions will be used in this study:

- *Acute illness:* A sudden illness requiring hospitalization.
- *Appetite:* An elder's score on the SNAQ.
- *Chronic illness:* A diagnosed medical condition that commonly affects appetite and weight in elders, to include but not limited to diabetes, CHF, and COPD (Olin et al., 2005; Yang et al., 2008).
- *Dementia:* A diagnosed Impairment of mental processing abilities.
- *Depression:* A diagnosed medical illness that presents with depressed mood and may be accompanied by lack of energy, decreased concentration, lack of interest in surroundings, and feelings of hopelessness.
- *Elderly:* Aged 65 years or older.

- *Long-term care facility:* A facility that provides nursing care to residents who need assistance with their activities of daily living.
- *Medications:* Common drugs that affect appetite in elders, to include but not limited to antidepressants, opioids, antipsychotics, anticonvulsants and anticholinergics (Sloane et al., 2008).
- *Significant weight loss:* Weight loss of $\geq 5\%$ of starting body weight in 1 month or over 6-months.
- *Weight:* Body weight measured in pounds to the nearest tenth in light clothing, with no prosthetic devices or other appliances, and using the facility's designated scale. Participants who require their weight to be measured while in a wheelchair must be weighed in the same wheelchair each time.

Instrumentation

The SNAQ was used to assess appetite in the participants (see Appendix A). Although *nutrition* is in the title of the SNAQ, it is an unmeasured variable that mediates between appetite and weight. The SNAQ, an instrument developed by a team of geriatric experts including physicians, nurse practitioners, dietitians, and pharmacists (Wilson et al., 2005), is a four-question Likert-type scale designed to measure appetite. The SNAQ contains questions concerning appetite, amount of food eaten, taste of food, and number of meals eaten. Each question has five possible responses, which are labeled (*a*) through (*e*). A response of (*a*) on a question receives a score of 1, whereas a response of (*e*) receives a score of 5. Each question has a possible score of 1 to 5, and scores from each question are summed to produce the total score. Total scores on the SNAQ can range

from 4 to 20. The findings of Wilson et al. (2005) indicate that a total score of ≤ 14 on the SNAQ is predictive of significant weight loss in elderly persons over a 6-month period.

Original testing using the SNAQ was performed between April 2002 and December 2003 in a major metropolitan area. The original study sample consisted of two groups of elders: a long-term care group and a community-dwelling group. Initially the long-term care group included 247 elders aged 79.2 ± 9.0 years; the community-dwelling group included 868 participants aged 53.5 ± 20.2 ; results of the study were reported for older subjects over 60 years of age ($n = 352$) and combined participants in the long-term care and community dwelling sample (Wilson et al., 2005).

Internal consistency and reliability of the SNAQ were established through correlations with the Appetite, Hunger, and Sensory Perception Questionnaire (AHSP), which is a validated tool used to assess appetite (Mathey, de Jong, et al., 2001; Savina et al., 2003). Wilson and colleagues (2005) reported a significant correlation ($r = .60$, $p < 0.001$) between the Council on Nutrition Appetite Questionnaire (CNAQ), a longer version of the SNAQ, and the AHSP in the long-term care group. Cronbach's alpha coefficient for the SNAQ was reported as 0.51 in the long-term care group. Sensitivity of the SNAQ was calculated by true-positive cases/ (number of true-positive cases + number of false-negative cases) and reported as 81.3 for 5% weight loss and 76.4 for 10% weight loss during the 6-month study period in participants ≥ 60 years of age. Specificity of the SNAQ was calculated by number of true-negative cases/ (number of true-negative cases + number of false-positive cases) and reported as 88.2 for 5% weight loss and 83.5 for 10% weight loss in participants ≥ 60 years of age during the 6-month study period.

At this time only a few studies have used the SNAQ to assess appetite in elders (Wilson et al., 2005; Hanisah et al., 2012; Engel et al., 2011; Rolland et al., 2012), and only one has evaluated its usefulness as a predictor of weight loss in elders (Wilson et al., 2005). Additional research is needed to further validate the SNAQ as an appetite assessment tool, and to further evaluate its usefulness in identifying elders at risk for significant weight loss.

Ethical Considerations

Approval to conduct the study was obtained from the Institutional Review Board at the University of Missouri–St. Louis. Permission in writing to conduct the study was also obtained from the administrator and/or the chief operating officer of each long-term care facility. A signed, approved consent form for each participant was obtained prior to any data collection. Consent for participants having a legal guardian or DPOA for health care in effect was obtained from the responsible parties prior to the subjects' participation in the study. Participants with difficulty reading forms were provided assistance. Contact information for the primary researcher was given to each participant and/or the responsible party at the time of consent. A phone number was provided to participants for questions or concerns relating to the research study. Privacy of records was maintained. Paper records were stored in a locked cabinet, and electronic records were kept on a secured computer.

Sampling and Settings

Study participants were recruited from four long-term care facilities located in the rural Midwest. Elders aged 65 years and older who did not have severe mental impairment were recruited for participation in the study. The recruitment of participants

was coordinated with long-term care facility staff members. Residents with a legal guardian or a durable power of attorney (DPOA) for health care in effect were not approached until after consent was obtained from their responsible parties. Residents able to give consent were allowed to do so.

Subject inclusion criteria included long-term care residents aged 65 years and older. Subjects with severe mental impairment who were unable to reliably answer questions about their appetite were excluded. Subjects receiving parenteral or enteral nutrition and/or hospice services were excluded from participation.

Based on a rule of thumb, a minimum sample size of 5 to 10 subjects per scale item is required for scale validation (DeVellis, 2003). Thus, an optimal sample size of 120 subjects was desirable to allow for 20% attrition.

Data Collection Procedures

Prior to the start of the study, potential participants were identified with the assistance of staff members in participating long-term care facilities. Subjects meeting study criteria were approached by the primary researcher to discuss possible participation in the study. Subjects able to consent were allowed to read the consent form and were given the option of having the consent form read to them. Questions regarding the study and consent form were answered. Participants unable to give consent were approached after consent was given by their responsible parties. The study was explained to subjects unable to give consent, and they were given the option to decline participation.

After consents were obtained, subjects were assigned numbers to protect their identities, and data collection was initiated. Demographic and health-related variables were collected from each participant's medical record. These variables included age,

gender, number and name of each subject's medical diagnoses, number and name of each subject's medications, diagnosis of depression and/or dementia, and number of times each participant was hospitalized during the 6-month study period.

Since the four participating long-term care facilities were located a significant distance from each other, data collection was not initiated in each long-term care facility until all eligible participants were enrolled. Thus, the researcher was able to assist with initial and monthly weights and administer appetite assessments to participants at all four long-term care facilities. Staff members at each long-term care facility provided assistance with weights; waiting to start data collection until all eligible participants were enrolled facilitated the researcher's ability to coordinate weight measurements with each long-term care facility's staff.

Prior to the start of weight measurements, education concerning proper weight measurement techniques was provided to staff members responsible for weighing participants at each facility. Participants who consented and were accepted into the study were weighed and administered the SNAQ (Wilson et al., 2005) by the primary researcher on the initial visit. Participants were then weighed and administered the SNAQ monthly for an additional 6 months.

Weights were measured each month, no fewer than 27 days and no more than 33 days after the previous weight measurement. Weight measurements were recorded to the tenth of a pound. The researcher was present during the initial and final weight measurements for each participant to ensure that weighing procedures were accurate. The primary researcher was present during most participants' monthly weight measurements and administered the appetite assessments to all but two residents who were out of the

facility on the day that the assessments were performed. Appetite assessments for these two residents were administered by a nurse trained in the proper administration of the assessment. If weight loss or excessive weight gain was noted for study participants, weight measurement was repeated within 72 hours for accuracy and reported to the appropriate staff member in each facility.

Participants' weight measurements were obtained using the standard scale available in each facility. Each facility maintains its scales by periodic calibrations that are performed by the manufacturer to ensure accuracy. Participants were weighed wearing light clothing. Participants unable to stand were weighed in their wheelchairs. The weight of the empty wheelchair was recorded for each subject and then subtracted from the subject's weight measurement to calculate each subject's true weight. Participants were weighed in the same wheelchair each month. Amputees were weighed without artificial limbs. Splints and other removable devices were removed prior to weight measurements. The SNAQ was administered by the primary researcher to each resident in the resident's room on the same day that he or she was weighed.

Data Analysis

Data were coded and entered into an Excel spreadsheet and then imported into SPSS Windows/21.0. Level of significance for the study was set at alpha .05. Exploratory statistics were used to examine outliers and missing data simultaneously on the major variables, body weight, and SNAQ items, and deleted cases with more than 10% of the data missing. These cases were deleted because when more than 10% of data is missing, statistical analyses are likely to be biased (Bennett, 2001). Descriptive statistics were used to describe the sample profile. Cronbach's alpha coefficient was calculated to

estimate internal consistency reliability of the SNAQ to answer research question 1: What is the internal consistency reliability of the SNAQ? Cross tabulation analysis was performed to answer research question 2: What is the sensitivity and specificity of the SNAQ in detecting significant weight loss of $\geq 5\%$ each month as well as over 6 months among participants?

For research question 3, Pearson's correlation analysis was used to answer if there was a significant association between SNAQ scores and significant weight loss of $\geq 5\%$ each month as well as over 6 months among participants? For research question 4, Pearson's correlation analysis was used to answer if there were significant correlations between poor appetite measured by the SNAQ and continuous variables, including age, dementia, depression, acute illness, chronic illness, and medications. Spearman's correlation analysis was used to examine the association between appetite and gender because gender is a categorical variable.

For research question 5, Pearson's correlation analysis was used to answer if there were significant correlations between significant weight loss and continuous variables, including age, dementia, depression, acute illness, chronic illness, and medications. Spearman's correlation analysis was used to examine the association between significant weight loss and gender because gender is a categorical variable.

CHAPTER IV

Results

This chapter presents the findings of the study. Characteristics of the sample and analysis of the research questions are presented.

Of 259 potential participants from 4 rural long-term care facilities located in the Midwest, 95 participants who met the inclusion criteria consented to participate in this study. Of those, 3 participants (2 male and 1 female) left the facility after their initial assessment and were eliminated; therefore, 92 participants were included in the data analysis (see Figure 2). Among the 92 participants, 72 (78.3%) were women and 20 (21.7%) were men. The mean age was 80.2 years ($SD = 8.7$), ranging from 65 to 97 years of age. All participants were Caucasian, with the exception of one African American, which is reflective of the geographic location. Participants had multiple diagnoses ($M = 7.8$, $SD = 2.3$) and took a substantial number of daily medications ($M = 10.2$, $SD = 3.6$). In addition, 46 (50%) had a diagnosis of dementia, and 55 (59.8%) had a diagnosis of depression (see Table 1). During the 6-month study period, 13 (14.1%) participants were hospitalized once, and 4 (4.3%) were hospitalized twice. Over the course of the study, 14 participants dropped out for various reasons, and a total of 78 (84.8%) of participants completed this 6-month longitudinal study (see Figure 2).

Research Question 1

Internal consistency and reliability was estimated for the SNAQ. Based on data collected at the beginning ($n = 92$) and at 6 months ($n = 78$) after enrollment, standard Cronbach's alpha coefficients were 0.51 and 0.56, respectively. However, item-total statistics indicated that Cronbach's alpha coefficients would improve from 0.51 to 0.57

and from 0.56 to 0.78, respectively, if question 4 were removed from the SNAQ.

Question 4 addresses the number of meals eaten in a day. In addition, inter-item correlations indicated that question 4 had a very low positive correlation with the other items in the initial data ($n = 92$) and a negative correlation with data collected at month 6 ($n = 78$). This finding suggested that question 4 may be problematic and could have an adverse effect on the values of the reliability coefficients for the current sample data of elderly living in the long-term care setting (Nunnally & Bernstein, 1994).

Research Question 2

A cross tabulation analysis was used to evaluate the sensitivity and specificity of the SNAQ for 5% weight loss in 1 month, as well as within 6 months. Results showed that the SNAQ had a low sensitivity for 5% weight loss in each of the 6 months during the course of this study. Sensitivity of the SNAQ was higher for $\geq 5\%$ weight loss at 6 months (see Table 2). Specificity of the SNAQ was high for 5% weight loss in each of the 6 months of the study, and also for $\geq 5\%$ weight loss at 6 months (see Table 1). Of the 19 participants who had significant weight loss of $\geq 5\%$ over 6 months, 14 lost 5% to less than 10% of weight, and 5 lost $\geq 10\%$ of weight.

Research Question 3

Pearson's correlation analysis was used to examine the associations between poor appetite measured by the SNAQ and significant weight loss of $\geq 5\%$ for each month as well as over 6 months. Results showed a positive correlation between poor appetite measured by the SNAQ and significant weight loss at 6 months ($r = .262$, $p = .021$), but no significant correlations between appetite and significant weight loss for each month.

Figure 2. Tracking Participants

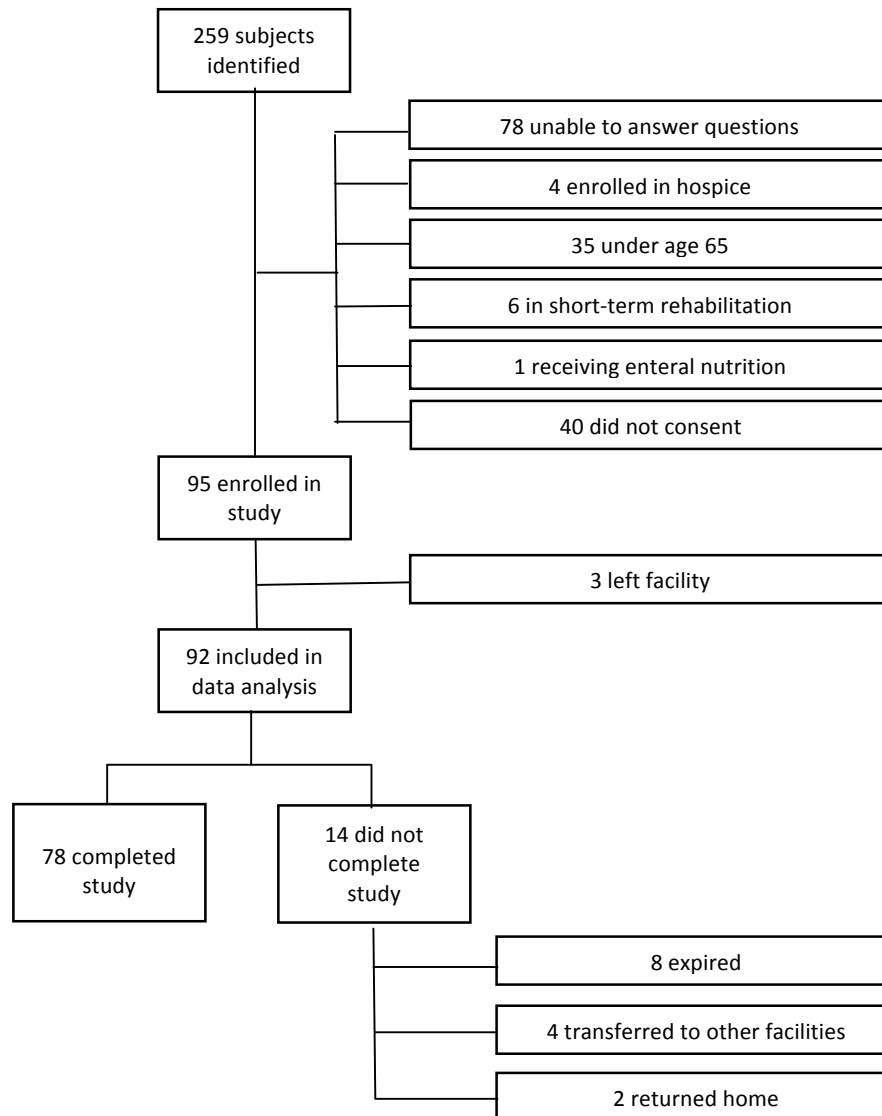


Table 1

Frequency, percent, or standard deviation of demographic and health-related characteristics

Variable	Frequency/%
Gender	
Male	20/22%
Female	72/79%
Diagnosis of dementia	46/50%
Diagnosis of depression	55/59.8%
One hospitalization	13/14.1%
Two hospitalizations	4/4.3%
	Mean/Standard Deviation
Age	80.2/8.7
Number of diagnoses	7.8/2.3
Number of daily medications	10.2/3.6

Research Question 4

Pearson's correlation analysis was used to examine the associations between poor appetite measured by the SNAQ and continuous variables, including age, dementia depression, acute illness, chronic illness, and medications over 6 months. Spearman's correlation analysis was used to examine the association between poor appetite and gender. Results showed a significant negative correlation between appetite and number of diagnoses ($r = -.343$, $p = .001$), suggesting that subjects with more diagnoses indicative of chronic illness had poorer appetites. A positive correlation was noted between SNAQ

scores and the presence of dementia ($r = .313$, $p = .01$), although results were not significant. This finding suggests that as dementia increased, so did appetite. No significant correlations were found between SNAQ scores and other variables by each month and over 6 months.

Table 2

Results of sensitivity and specificity of the SNAQ for significant weight loss ($\geq 5\%$) and n of participants with significant weight loss each month over 6 months

Time Interval	Sensitivity	Specificity	n of Participants	Validate Sample
In month 1	5.7%	100%	4	92
In month 2	7.8%	92%	6	90
In month 3	8.0%	97%	5	89
In month 4	6.4%	97%	4	85
In month 5	4.5%	95%	4	82
In month 6	4.8%	97%	3	78
Over 6 months	26%	74%	19	78

Research Question 5

Pearson's correlation analysis was used to examine the associations between significant weight loss and continuous variables including age, dementia, depression, acute illness, chronic illness, and medications over 6 months. Spearman's correlation analysis was used to examine the association between significant weight loss and gender. Results indicated a positive correlation between significant weight loss and number of medications ($r = .333$, $p = .002$) at month 5. This finding suggests that as the number of medications increased, significant weight loss also increased in participants. A negative

correlation was found between significant weight loss and times hospitalized ($r = -.299$, $p = .005$) at month 4, indicating that participants who had significant weight loss also had more hospitalizations by month 4. No significant correlations were found between significant weight loss and other variables by each month as well as over 6 months.

Table 3

Participants with weight loss each month and SNAQ scores

		SNAQ score ≤ 14	SNAQ score > 14	Total population
Weight loss $\geq 5\%$ at 1-month intervals				
Month 1	n = 3	3	0	n = 92
Month 2	n = 6	4	2	n = 90
Month 3	n = 5	4	1	n = 89
Month 4	n = 4	3	1	n = 85
Month 5	n = 4	2	2	n = 82
Month 6	n = 3	2	1	n = 78
Weight loss $\geq 10\%$ at 6 months				
	n = 5	4	1	n = 78

CHAPTER V

Discussion

In this chapter, the purpose of the study is presented along with discussion of the research questions. The implications for nursing science and nursing practice are presented, and implications for future research studies are outlined.

Weight loss is a common finding in elders living in long-term care facilities. Loss of appetite can be a contributing factor to weight loss in elders (Wilson et al., 2005), and weight loss can increase an elder's risk of death (Sullivan et al., 2002). Despite the poor clinical outcomes that can result from decreased appetite and weight loss in elders living in long-term care facilities, tools to assess appetite and nutritional risk are limited and are not routinely used (Jones, 2002). Literature concerning nutrition and appetite in elders living in long-term care facilities is limited and fragmented. Additional research is needed to better understand weight loss, appetite, and nutritional risk in elders living in long-term care facilities.

The purpose of this study was to determine if the Simplified Nutritional Appetite Questionnaire (SNAQ), an appetite assessment tool, is a reliable, valid, and sensitive self-reported measure for assessing the risk for significant weight loss in residents living in long-term care facilities over a 6-month period. The internal consistency reliability and descriptive validity of the SNAQ in identifying significant weight loss in elders were also examined. In addition, the study was designed to examine the relationships between appetite and weight loss and socio-demographic variables and health status characteristics in participants. It is important to remember even though *nutrition* is in the title of the SNAQ, it is an unmeasured variable that mediates between appetite and weight.

Discussion of the Results

In order for the SNAQ to be deemed a valid and reliable appetite assessment tool, reliability and validity must first be established. In the present study, Cronbach's alpha was calculated using initial SNAQ ($\alpha = 0.51$) and SNAQ at 6 months ($\alpha = 0.56$). Others have reported similar alpha coefficients (Hanisah et al., 2012; Sties et al., 2012). In this investigation, the initial month and the month 6 data indicated that Cronbach's alpha coefficients for the SNAQ improved from 0.51 to 0.57 and 0.56 to 0.78, respectively, when question 4 was removed. Question 4 addresses the number of meals eaten in a day. In this study, elders living in the four long-term care facilities were served three meals a day and were strongly encouraged to eat something at each meal. This may account for the fact that most participants answered question 4 as "three meals a day". In addition, inter-item correlations were similar among questions 1, 2, and 3, but low for question 4, indicating that question 4 may not adequately reflect the appetite of elders living in an environment such as the long-term care facilities used in the current study with very structured meal times. In a recent study, Sties et al. translated and validated a Brazilian version of the SNAQ. They reported decreased factor loadings for question 4 and an increased alpha when question 4 was removed from the SNAQ. In this study, the SNAQ showed stability over time, and with question 4 removed, it demonstrated acceptable reliability and internal consistency. Additional research is needed to determine if question 4 should be removed from the SNAQ when administered to elders living in environments with structured meal times.

The construct validity for the SNAQ was evaluated and supported by significant correlations with number of diagnoses ($r = .343$, $p = .001$) and dementia ($r = .313$, $p =$

.01). The sensitivity and specificity of the SNAQ were also examined. In this study, the SNAQ showed low sensitivity and high specificity for detecting significant weight loss each month and at 6 months in participants. However more than 50% of participants scored ≤ 14 on the SNAQ each month (see Table 4). This would suggest that the majority of participants who were enrolled in the study had a poor appetite. Most elders who lost $\geq 5\%$ of their weight each month and over 6 months scored ≤ 14 on the SNAQ (see table 3). The study sample was small; only a few participants had significant weight loss each month and over 6 months (see Table 3). In this study, initially the definition of significant weight loss was 5% over one month or 10% over 6 months based on the established parameters for weight loss in the Minimum Data Set used in long-term care facilities to formulate resident care plans suggested by Center for Medicare and Medicaid Services Manual (2008). Because few elders' weight loss was 10% at 6 months, data analysis was performed using $\geq 5\%$ at month 6.

Weight and appetite were measured monthly in this study, in comparison with other studies that measured these variables less often (Wilson et al., 2005; Suzana, Hanis, Tang, Ayiesah, & Roslina, 2008). Subjects in this study were older than those in other studies utilizing the SNAQ for appetite assessment (Suzana et al., 2008; Engel et al., 2011; Sties et al., 2012; Wilson et al., 2005). It is important to note that this present investigation is the only study known in which the sample comprised elders who all resided in long-term care facilities. Some participants in this study had both weight gain and weight loss during the study period. It is difficult to predict how long an elder may have a decreased appetite before weight loss occurs. In the long-term care setting, where weight is assessed on a routine basis, interventions may be started once weight loss is

identified or when decreased food intake is noted. No intervention in these circumstances would be unethical. These interventions may have prevented or delayed weight loss in participants even if the SNAQ identified a poor appetite. Elders with dementia were included in the study, and although they did not have difficulty answering the questions, it is possible that they did not answer the questions accurately. It was noted by the researcher that most participants answered question 4 as “three meals a day.” It is possible that although the participants received three meals daily they did not eat them. All of these factors could have affected the sensitivity of the SNAQ in this study. Low sensitivity of the SNAQ is concerning since the goal of appetite assessment is to identify elders who have a decreased appetite and who are at risk for significant weight loss. However, in this population a lower cutoff score may be required, since the majority of participants were noted to have a poor appetite throughout the study period.

Table 4

Participants' Appetite Scores

	Total participants	SNAQ score ≤ 14	SNAQ score > 14
Month 1	n = 92	n = 53	n = 39
Month 2	n = 90	n = 51	n = 39
Month 3	n = 89	n = 50	n = 39
Month 4	n = 85	n = 47	n = 38
Month 5	n = 82	n = 44	n = 38
Month 6	n = 78	n = 42	n = 36

The SNAQ showed high specificity, indicating that it reliably identified those subjects without poor appetite and those without significant weight loss. Although

appetite appears to be a significant factor in weight maintenance, numerous mediating factors can contribute to weight loss in elders. The difficulty lies in determining what these factors are for each individual elder.

In examining the associations between poor appetite and significant weight loss, the variable poor appetite was recorded as 1 = yes and 0 = no. A positive correlation ($r = .262$, $p = .021$) was noted between poor appetite and significant weight loss ($\geq 5\%$) at 6 months. This finding suggests that participants with poor appetite had significant weight loss similar to findings by Wilson et al. (2005), which also reported poor appetite to be a contributing factor to weight loss in elders.

Examining the associations between poor appetite and the variables socio-demographics (age) and health characteristics (dementia, depression, acute illness, chronic illness, and medications), construct validity of the SNAQ was supported by significant correlations with number of diagnoses ($r = -.343$, $p = .001$) and dementia ($r = .313$, $p = .01$). A negative correlation between SNAQ scores (appetite) and number of diagnoses ($n = 92$, $r = -.343$, $p = .001$) was reported in the present study. This finding suggests that elders with higher numbers of chronic diagnoses had poorer appetites than those who had fewer diagnoses and that chronic illness is associated with decreased appetite. This finding is consistent with others who have reported poor appetite and weight loss in elders with chronic illness (Wikby & Fägerskiöld, 2004; Knudtson et al., 2005; Suzana et al., 2008).

A positive correlation between SNAQ scores (appetite) and dementia ($n = 78$, $r = .313$, $p = .01$) was also noted. This indicates that participants with a diagnosis of dementia had good appetites. This is an interesting finding, because Wilson et al. (2005)

excluded elders with dementia who scored less than 18 on the Mini-Mental Status Examination. In the present study, only elders with severe dementia were excluded from the study. Elders with a diagnosis of dementia were enrolled in the study if the investigator determined that the elders were able to answer the questions on the SNAQ. Assistance from health care staff and providers at each facility also helped with the selection process of elders with dementia. The primary researcher, a geriatric nurse practitioner who was familiar with the majority of the residents, administered the SNAQ to residents verbally. Residents with a diagnosis of dementia were able to answer questions on the SNAQ without difficulty. Participants with a diagnosis of dementia may not have answered questions on the SNAQ accurately. Guérin et al. (2005) found that elders with dementia had increased weight loss with progression of the disease; whereas Cronin-Stubbs et al., (1997) reported no increased weight loss with progression of the disease. Participants with severe dementia were excluded from the study; therefore, it is possible that participants with a diagnosis of dementia had better appetites. Results of this study suggest that since a diagnosis of dementia is common in residents living in long-term care facilities, assessment tools that cannot be reliably used in elders with mild to moderate dementia have limited utility in this population. In this study, there was no association between SNAQ scores (appetite) and age and/or gender. This is in contrast to a recent study of Asian elders in which poorer appetite was noted more in women than in men assessed with the SNAQ (Hanisah et al., 2012).

A positive correlation was noted between number of routine medications and significant weight loss ($r = .333$, $p = .002$, $n = 82$) at month 5. This suggests that subjects with a high number of daily medications lost more weight than elders who took fewer

daily medications. Number of medications may be directly related to the degree of chronic illness. In the present study, number of diagnoses (which was defined as chronic illness) was negatively correlated with appetite. In this study, it appears that chronic illness requiring increased number of medications may be associated with appetite loss and weight loss in elderly participants. Participants received an average of 10 routine medications, and this did not include medications administered as needed or intermittently. These findings are consistent with Jones et al. (2009), who reported about half of residents living in long-term care facilities receive nine or more medications daily. The risk of adverse drug reactions increases with the number of medications taken by an elder daily (Field et al., 2001). Medication side effects can affect nutrition and appetite and increase the risk of weight loss in elders (Sloane et al., 2008). Therefore, proper management of chronic illnesses and medications used to treat these chronic illnesses should be carefully examined in elders with decreased appetite and/or weight loss.

In addition, a negative correlation was noted between significant weight loss and acute illness (times hospitalized) at month 4 ($r = -.299$, $p = .005$). This suggests that elders who had significant weight loss also had more hospitalizations by month 4. This finding is in agreement with others (Guigoz, 2006, Azad, Murphy, Amos, & Toppan, 1999; Stratton et al., 2006) who reported nutritional deficiencies in elders with recent hospitalization. Hospitalization is often a traumatic experience for an elder. Daily routines are altered, and an elder may remain in bed for extended periods of time during hospitalization. A fasting state may be required prior to procedures and diagnostic tests. Normal caregivers are not usually present to assist elders with meals during hospitalization. Medications can cause constipation, nausea, and lethargy, and this can

lead to decreased appetite and food intake. In elders with dementia, change in environment and routines can contribute to increased confusion and may result in decreased food intake. These factors as well as others can result in appetite loss, increased nutritional risk, and ultimately weight loss in elders during periods of acute illness and hospitalization. In this study, five out of eight elders who expired during the study period had a hospitalization. Therefore, appetite assessment and frequent weight measurements should be a priority for elders returning to long-term care facilities post hospitalization.

Weight loss and poor appetite can occur at the time of hospitalization, after hospitalization, or not at all. Admitting hospital diagnosis and hospital length of stay may impact risk of poor appetite and weight loss in elders with acute illness. No correlations were found between significant weight loss and age and/or gender.

Implications for Nursing Science and Practice

In this study, the SNAQ was found to be a quick and simple appetite assessment tool that can provide important information about an elder's appetite. In long-term care facilities, multiple disciplines work together to provide needed patient care. Tools such as the Geriatric Depression Scale and Mini-Mental Status Examination are routinely used in long-term care facilities to evaluate depression and mental capacity. Findings from this investigation suggest that the SNAQ could be added as a screening tool to help identify elders who have poor appetite. This is important because if an elder is identified as having a poor appetite, this information can be used to develop appropriate interventions to prevent potential weight loss. In addition, in long-term care facilities, this information may be useful for the pharmacist who reviews residents' medications, the speech

therapist who evaluates swallowing and diet modifications, the physical therapist who evaluates functional difficulties, the psychiatrist who assesses for mental disorders such as depression, the dietitian who evaluates for food preferences, the family who assists with dietary requests, nursing care staff who oversee the nursing care, and primary care nurses and physicians who coordinate the overall care plan and management of acute and chronic illness in the elders.

Although the sensitivity of the SNAQ was low for identifying elders with significant weight loss, it is inexpensive, quick, and easy to use and provides information about appetite that can be used along with meal intake and weight measurement to identify nutritional risk. The SNAQ could also be beneficial in assessing residents new to the long-term care facility and for residents returning to the facility after hospitalization.

Finally, it is important for nurses working in long-term care facilities to understand the relationship between appetite and weight loss in elders. If an elder has a decreased appetite, usual interventions for weight loss may not be effective. Providing increased food and nutritional supplements to elders who have a poor appetite are often unsuccessful. Thus, nurses are often the first health care provider to identify that the usual plan of care may not be effective. As a result, planned interventions are needed by nurses who understand the many factors that can contribute to poor appetite and weight loss in elders with decreased weight and/or meal intakes to reduce the risk of poor clinical outcomes.

Discussion of Conceptual Model

The conceptual model was derived from the literature review. The model was successful in addressing the complexity of factors that should be considered when

evaluating appetite and weight in elders living in long-term care facilities. Although the model is not comprehensive, it addressed some of the most common factors that should be considered in elders living in long-term care facilities: socio-demographics (age and gender) and health status characteristics (dementia, depression, acute illness, chronic illness, and medications). For example, participants with more diagnoses indicative of chronic illness had poorer appetites. Thus, the model is helpful to guide assessment and interventions in elders with poor appetite and/or weight loss. Knowing whether an elder has a good or poor appetite can help to guide the plan of care and decrease nutritional risk. The present study suggests that elders living in long-term care facilities have an increased risk of poor appetite. Although the majority of participants were noted to have poor appetite, only a few lost 5% or more of their body weight each month. This reaffirms that factors other than appetite can contribute to weight loss in elders living in long-term care facilities. This finding supports the use of a multidisciplinary approach in assessing and developing interventions for elders living in long-term care facilities who lose weight.

Limitations and Strengths of the Study

There are various limitations of the study.

- The sample size was small.
- Subjects were recruited from four different long-term care facilities. It is possible that there were differences in the samples of subjects drawn from each long-term care facility.
- The sample population consisted of mostly white women; other ethnic groups and men were underrepresented.

- Nutritional interventions initiated during the study for residents with weight loss and/or appetite loss may have influenced study outcomes.
- Some residents included in the study had fluctuating edema, and this may have caused weight measurement errors, as increased edema can mask weight loss.
- The SNAQ is a self-reported instrument, which may affect its reliability.
- Half of the residents included in the study had a diagnosis of dementia. It is possible that although these residents were able to answer the questions on the SNAQ, their responses may not have been accurate.
- A condition of institutional participation was that the investigator would not disaggregate the data by facility.

There were also various strengths of the study.

- The sample included only long-term care residents.
- A large number of residents with a diagnosis of dementia were included in the study population, and these residents did not have difficulty answering the questions on the SNAQ.
- The primary researcher verbally administered the SNAQ to all participants except two. This allowed participants to clarify questions at the time of administration of the SNAQ.
- The primary researcher was present and supervised most weight measurements of participants.
- Weight measurements were performed and the SNAQ was administered each month for 6 months.

- Including participants from four different long-term care facilities increases the ability to generalize the study findings.

Recommendations for Future Research

Based on the findings from this study, the following are recommendations for future nursing research:

- The SNAQ needs further evaluation in another study to determine its effectiveness as an appetite assessment tool for long-term care residents and for those with dementia and depression.
- Future research might include an investigation to determine if the SNAQ can be used in combination with staff and family input in answering questions on the SNAQ. Meal intakes could be used to evaluate the accuracy of answers to questions 1 and 2, and staff observation for corroborating question 4. This might help to further clarify the use of the SNAQ in elders with dementia.
- Additional research is needed to clarify if question 4 in the SNAQ should be deleted when being administered to elders living in long-term care facilities.
- More research is needed to further define factors associated with appetite and weight loss in elders living in long-term care facilities.
- Assessment tools aimed at identifying elders with nutritional risk need to be refined and developed.
- Additional studies focusing on interventions and multidisciplinary approaches to nutritional care planning in long-term care facilities are needed.

- Additional research to evaluate the sensitivity and specificity of the SNAQ in elders living in long-term care facilities is needed.

Conclusions

In conclusion, the study findings emphasize the need to identify nutritional risk, poor appetite, and weight loss in elders living in long-term care facilities. Appetite is an important factor that affects weight, and assessment of appetite is important in preventing weight loss in elders. Many factors contribute to loss of appetite and weight in elders, some of which are yet to be explored. In this population, the SNAQ showed low sensitivity for significant weight loss in participants. However, more than half of participants each month scored ≤ 14 on the SNAQ, indicating poor appetite. Most participants who lost $\geq 5\%$ of their weight each month and over 6 months reported a poor appetite. Even though the sensitivity of the SNAQ was low, responses to the questions on the SNAQ can be used to guide interventions targeted at preventing weight loss in elders. Associations between number of medications and times hospitalized and significant weight loss and number of diagnoses and appetite were noted. These findings stress the importance of chronic illness and acute illness in relationship to appetite and weight loss in elders living in long-term care facilities and highlight the significance of optimal medical management of chronic and acute illness. It would appear that elders who are sicker should have more frequent appetite assessments and weight measurements to prevent poor clinical outcomes. Further research is needed to clarify if the SNAQ can be modified to increase its sensitivity in elders living in long-term care facilities. In summary, this research leaves many questions unanswered concerning appetite and weight loss in elders, which leaves open multiple avenues for new research.

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Appendix A

<p style="text-align: center;">SNAQ Simplified nutritional appetite questionnaire</p>

Participant ID: _____

Instructions: Ask the participant to complete the questionnaire by circling the correct answer to each question. Then tally the results based on the following scale: a = 1, b = 2, c = 3, d = 4, e = 5. The sum of the scores for the individual items constitutes the SNAQ score. *SNAQ score ≤ 14 indicates significant risk of at least 5% weight loss within 6 months.*

1. My appetite is

- a. very poor.
- b. poor.
- c. average.
- d. good.
- e. very good.

2. When I eat,

- a. I feel full after eating only a few mouthfuls.
- b. I feel full after eating about a third of a meal.
- c. I feel full after eating over half a meal.
- d. I feel full after eating most of the meal.
- e. I hardly ever feel full.

3. Food tastes

- a. very bad.
- b. bad.
- c. average.
- d. good.
- e. very good.

4. Normally I eat

- a. less than one meal a day.
- b. one meal a day.
- c. two meals a day.
- d. three meals a day.
- e. more than three meals a day.

Appendix B

Demographic Data Sheet

Participant ID:	Date:
Age:	
Chronic Diagnosis:	
Diagnosis of: <input type="checkbox"/> Dementia <input type="checkbox"/> Depression	
Hospitalization(s) in the last 30 days? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Gender: <input type="checkbox"/> Male <input type="checkbox"/> Female	
Medications:	
Weights and SNAQ Scores: Initial: 1 month: 4 months: 2 months: 5 months: 3 months: 6 months:	